TECHNOLOGY DEPT.

Gas Journal

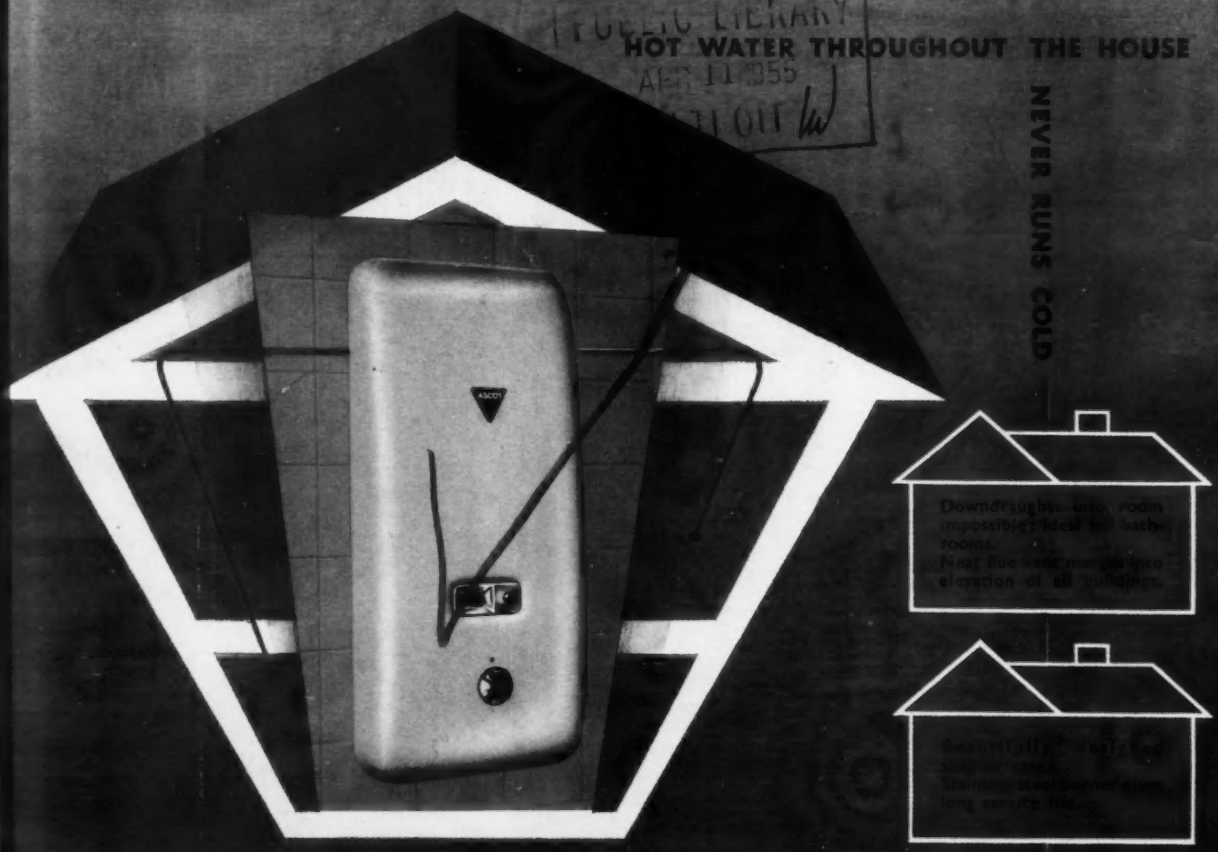
VOL. 281. 107th YEAR. LONDON, MARCH 16, 1955 No 4789. PRICE 1/3

ASCOT 715

BALANCED FLUE MULTIPOINT GAS WATER HEATER

HOT WATER THROUGHOUT THE HOUSE

NEVER RUNS COLD



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REPAIRS AND
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OF ANY SIZE AND DESIGN
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Illustration by courtesy of Scottish Gas Board, Ed. Div.

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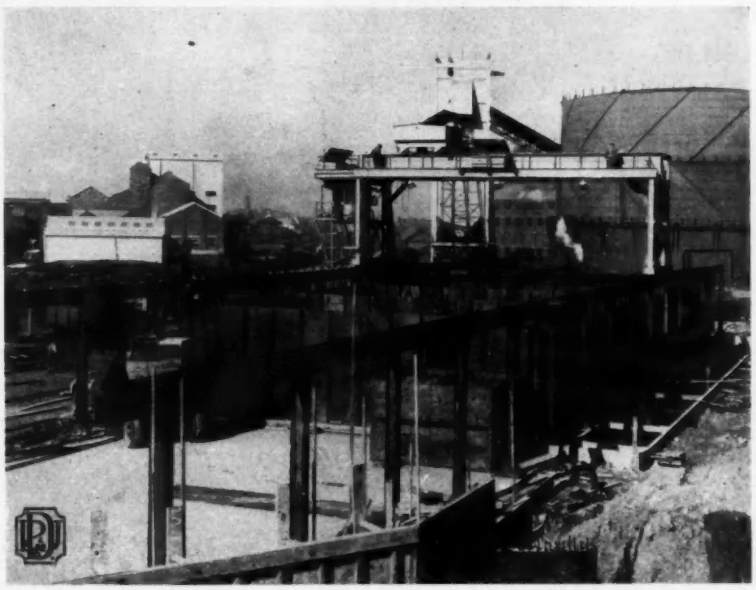

One of our 7 million cu. ft. per day capacity TRAY PURIFIER INSTALLATIONS in the course of erection. *(Photograph by courtesy of the North Western Gas Board)*

TRAY PURIFIERS can be economically designed for all capacities, and can be shown to save those oxide-handling costs which have long been accepted as inevitable in dry-box purification.

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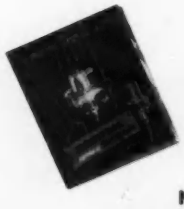
AUTOMATIC
Shut off **VALVE**



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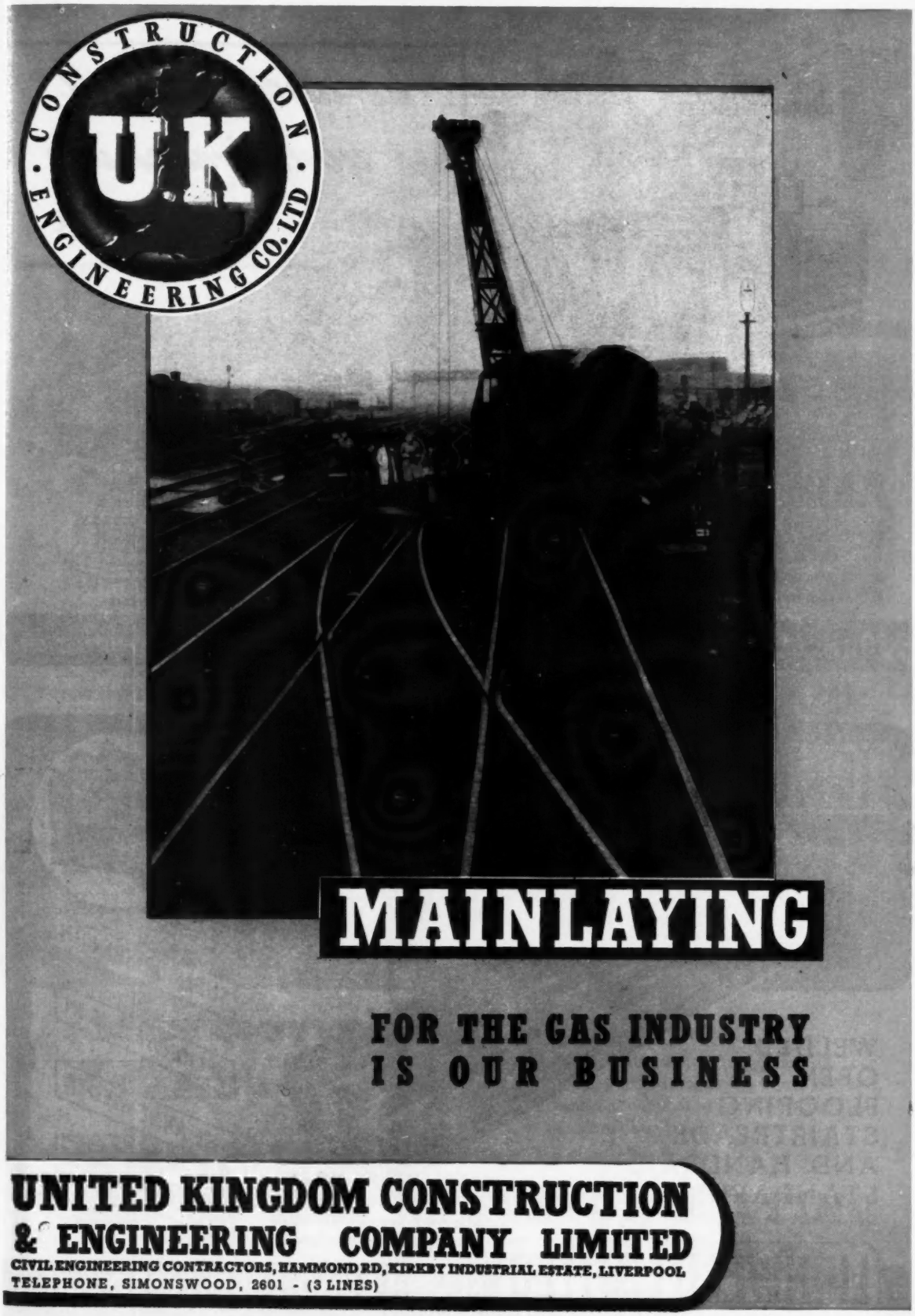
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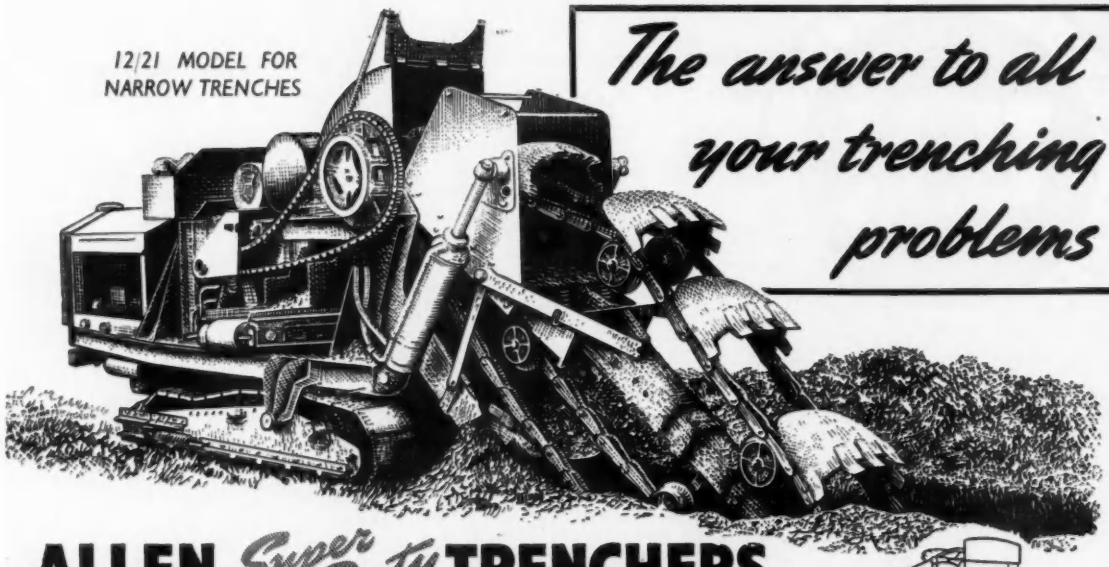

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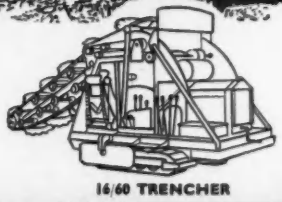

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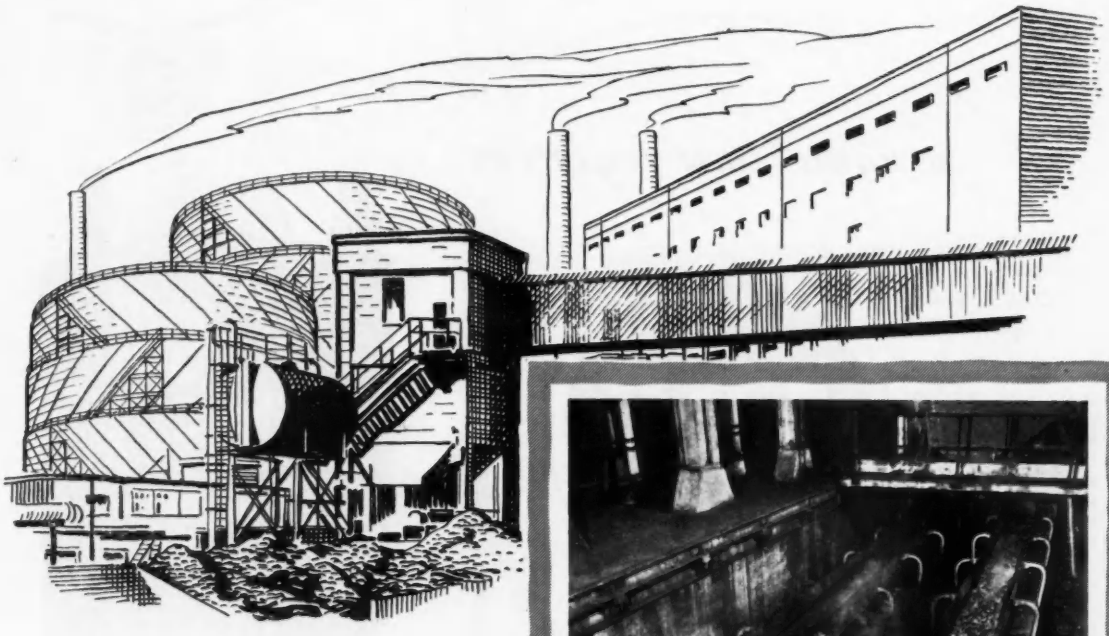

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These long BTR hot coke conveyors each carry 330 tons of hot quenched coke per day. They were installed in April 1953 and still show no signs of wear in this notoriously punishing service.

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GAS METERS

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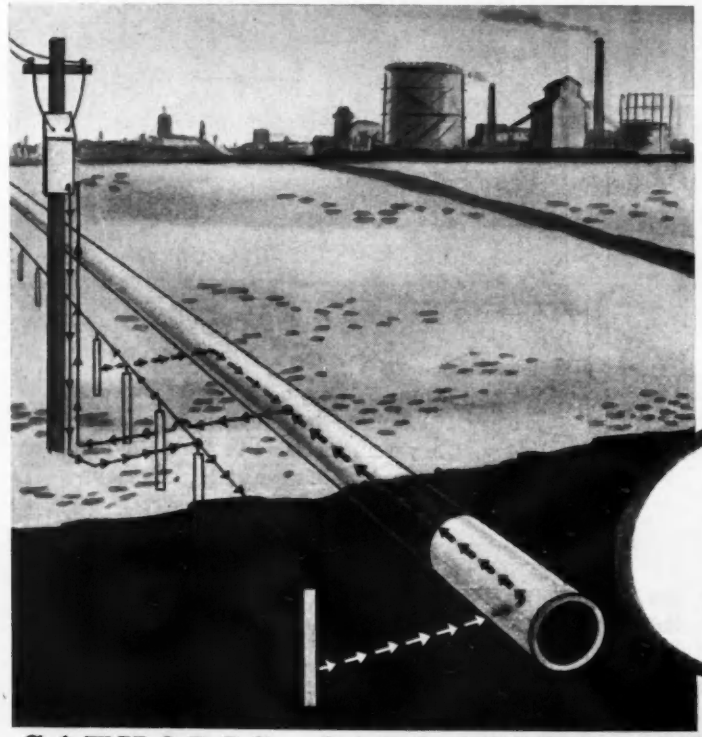
and at LONDON and NOTTINGHAM



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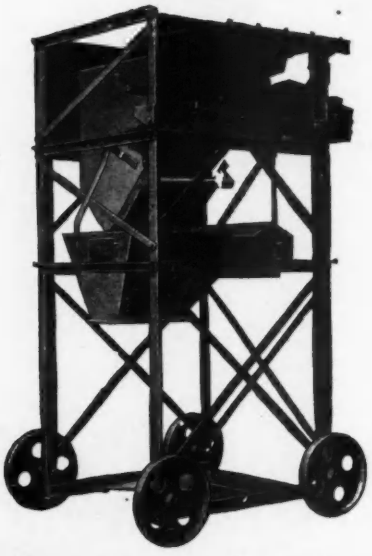

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Capacity: 28 to 112 lbs. per discharge (nett).

Speed of Weighing: Up to six weighings per minute.

Guaranteed accuracy and continuity of operation.

Machines may be seen working by appointment.

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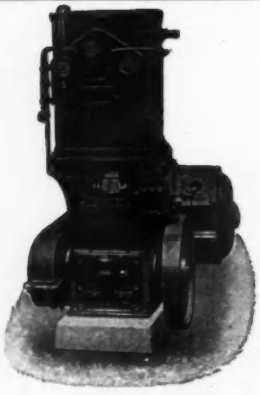
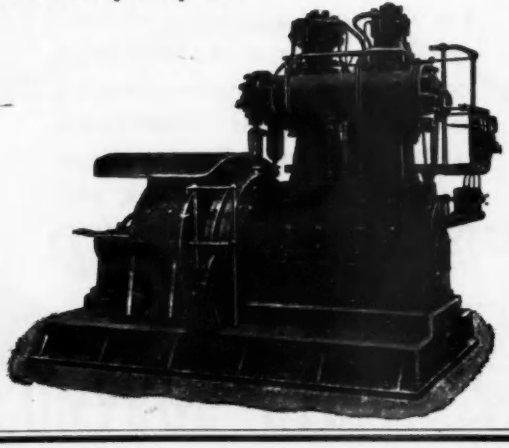


HIGH PRESSURE GAS COMPRESSORS *for pressures up to 5,000 lbs. per sq. in.*

The illustrations show two high pressure gas compressors which we made recently to order. As specialists in the design and manufacture of compressors for both air and gases, we make compressors for a wide range of capacity and pressure up to 5000 lbs. per sq. inch.

The compressor shown above has a capacity of 25 cu. ft. of free hydrogen per minute compressed to 3000 lbs./sq. inch. The illustration on the right shows a four-stage compressor with a delivered capacity of 200 cu. ft. of free town's gas per minute compressed to 5000 lbs. per sq. inch.



For full information regarding gas compressors, write, giving particulars of the duty required, to—

REAVELL & CO., LTD.

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Telegrams: "REAVELL, IPSWICH." Phone Nos. 2124 & 2125

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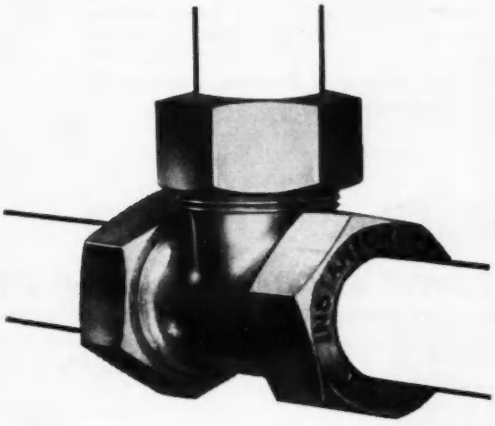
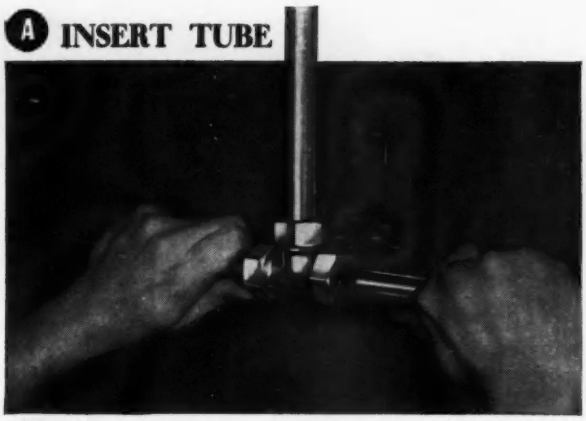
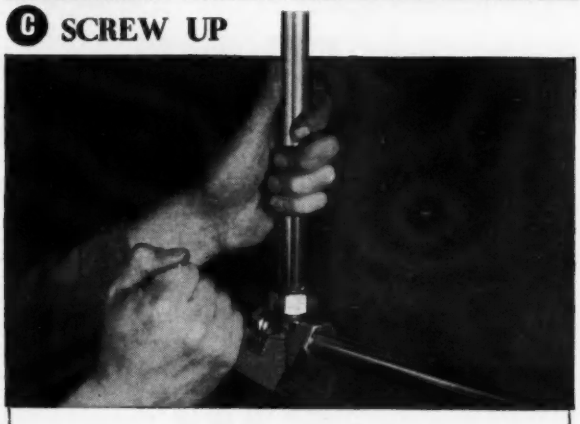






Fyffe's 'Instantor' is the fitting with the *double* interlocking grip. It provides a sound reliable joint quickly and economically, does not restrict the bore, and can be readily dismantled and reassembled. There is a complete range of Fyffe's 'Instantor' fittings for hard and half hard copper tubing to B.S. 659 and plastic tubing to B.S. 1972.

ALSO

Fyffe's 'CONEOR'—

for joints of great mechanical strength; particularly suitable for underground services

Fyffe's 'INTEX' PT—

the neat, strong pre-tinned capillary fitting for domestic installations including gasfitting

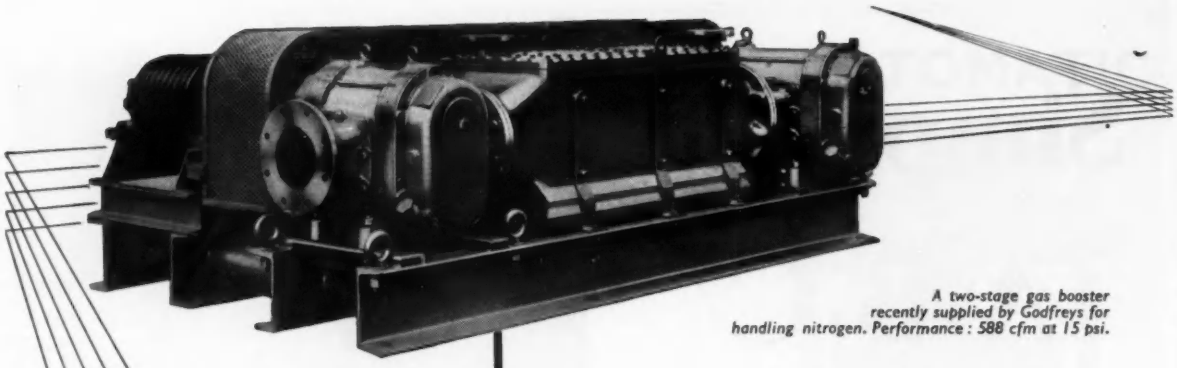
...a perfect joint with Fyffe's INSTANTOR fittings

F.23

FYFFE'S FITTINGS

trouble free to fit—trouble free in service

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1



A two-stage gas booster recently supplied by Godfreys for handling nitrogen. Performance : 588 cfm at 15 psi.

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Godfrey positive displacement gas boosters are suitable for handling most commercially used gases with complete safety ; special seals are fitted to ensure oil-free delivery.
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WITH AN ACE COKE DE-BREEZING SCREEN

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All types of MOBILE DE-BREEZERS complete with skip hoist.

Standard unit arranged for BULK LOADING gives 50 tons of clean coke per hour.

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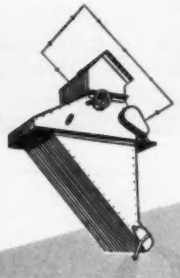
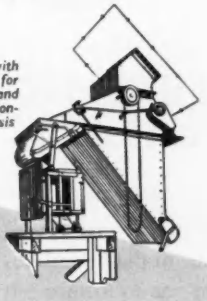
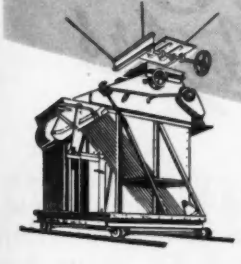


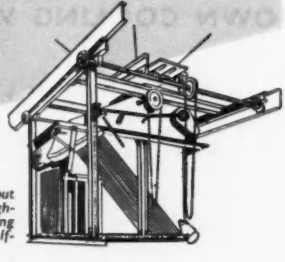
Standard unit arranged for continuous running, as used for truck or lorry loading.



Standard unit fitted with clutch and hand control for de-breezing, weighing and bagging coke as a self-contained unit on one chassis



Standard unit but incorporating weighing and bagging equipment as a self-contained unit on one chassis.



Standard unit but incorporating weighing and bagging equipment as a self-contained unit.

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use the STRONGEST, SAFEST METER LOCK

- DON'T buy locks you may have to scrap in a few years
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- DON'T think only of the present time; look to the future
- DO remember that good quality is cheapest in the long run
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- DO profit by others' experience and use M. & M. Locks to protect your meters

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FOR
AUTOMATIC IGNITION
OF
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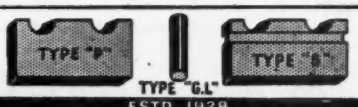
GET IN TOUCH WITH THE ACTUAL MANUFACTURERS



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(CONTRACTORS TO H.M. GOVERNMENT)

THE COOLERS THAT CUT DOWN COOLING WATER BILLS

VISCO STEELSHELL Water Coolers

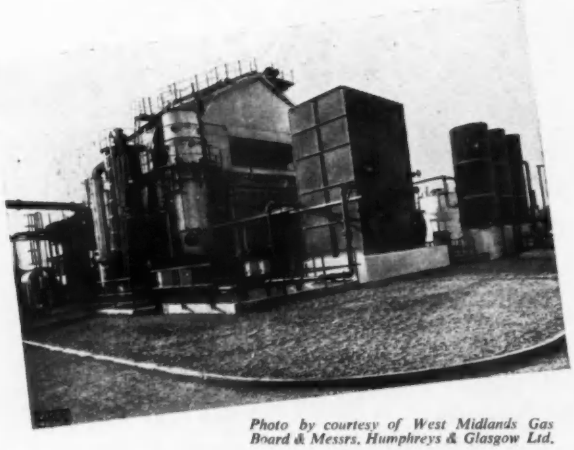

Photo by courtesy of West Midlands Gas Board & Messrs. Humphreys & Glasgow Ltd.

As many users have proved to their satisfaction, "Visco" Steelshell Water Coolers effect a big reduction in cooling water consumption; usually about 97%, compared with Mains water used once only and run to waste. With these units the cooling water is re-circulated continuously with only a very small loss by evaporation.

We illustrate one "Visco" Steelshell Cooler, capacity 7,500 g.p.h. working in conjunction with a catalytic oil gas plant at Stafford.

We have all sizes from 250 g.p.h. up. *Write for List No. 514.*

Consult us on your Water Cooling problems

VISCO ENGINEERING CO. LTD. STAFFORD RD. CROYDON

Ranges from 0·2 inches water gauge to 30 lb. per square inch. Two-pen recorders are available for process control. Differential head ranges from 1 inch water gauge up to 10 inches water gauge.

EASY TO READ

Arkon Recorders measure gas and air flow, pressure or vacuum or pressure and vacuum. They give a clear, unmistakable record which you can read like a book, without hesitation and without mistakes. You can leave the chart on for a few hours, a day, or a week—the record will always be there. Easily read, easy to look after, robust enough to stand on the job, Arkon Instruments can help the control of any process —and their accuracy will satisfy even the boys in the lab.

FOR PROBLEMS LIKE THESE

The recording and integration of rate of flow of gas or air. The measurement of low pressures or vacua. The measurement of industrial effluents to meet the requirements of River and Sewage Boards.

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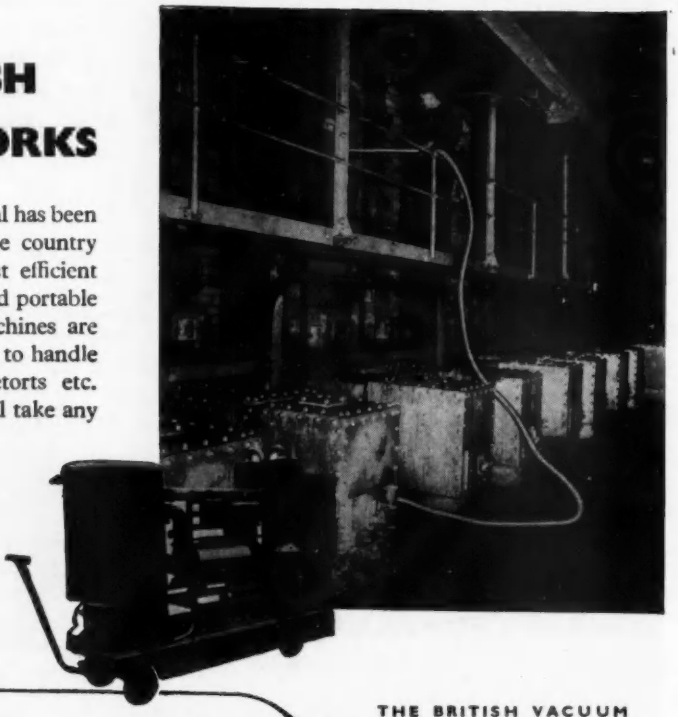
The illustration shows Redditch Gas works where a portable B.V.C. machine operates through an installed pipe system. Full particulars of these and other installations on request.



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remote indication and control

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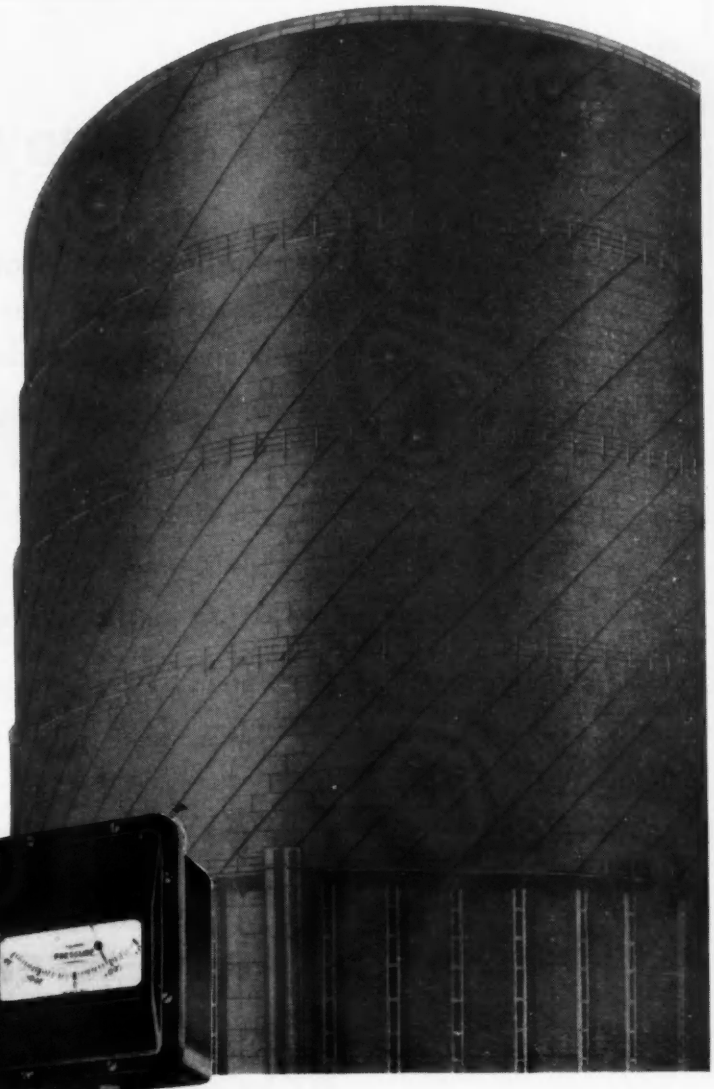

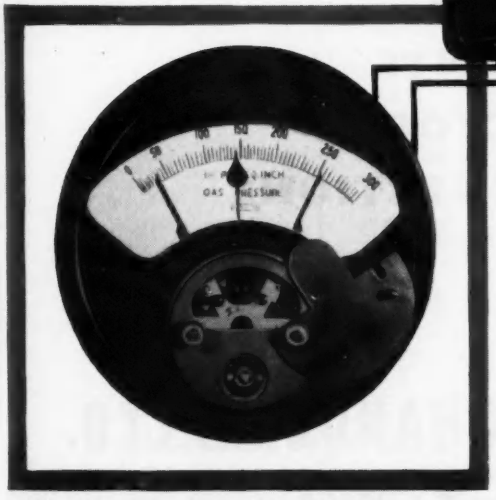

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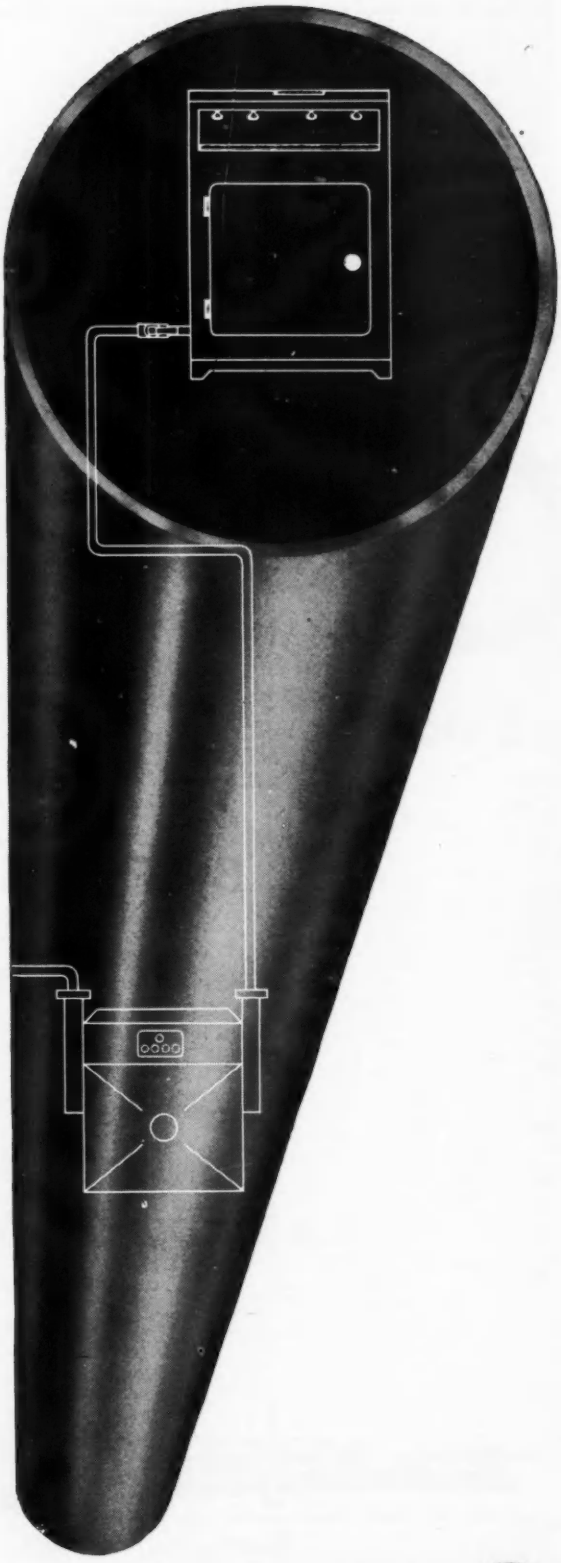

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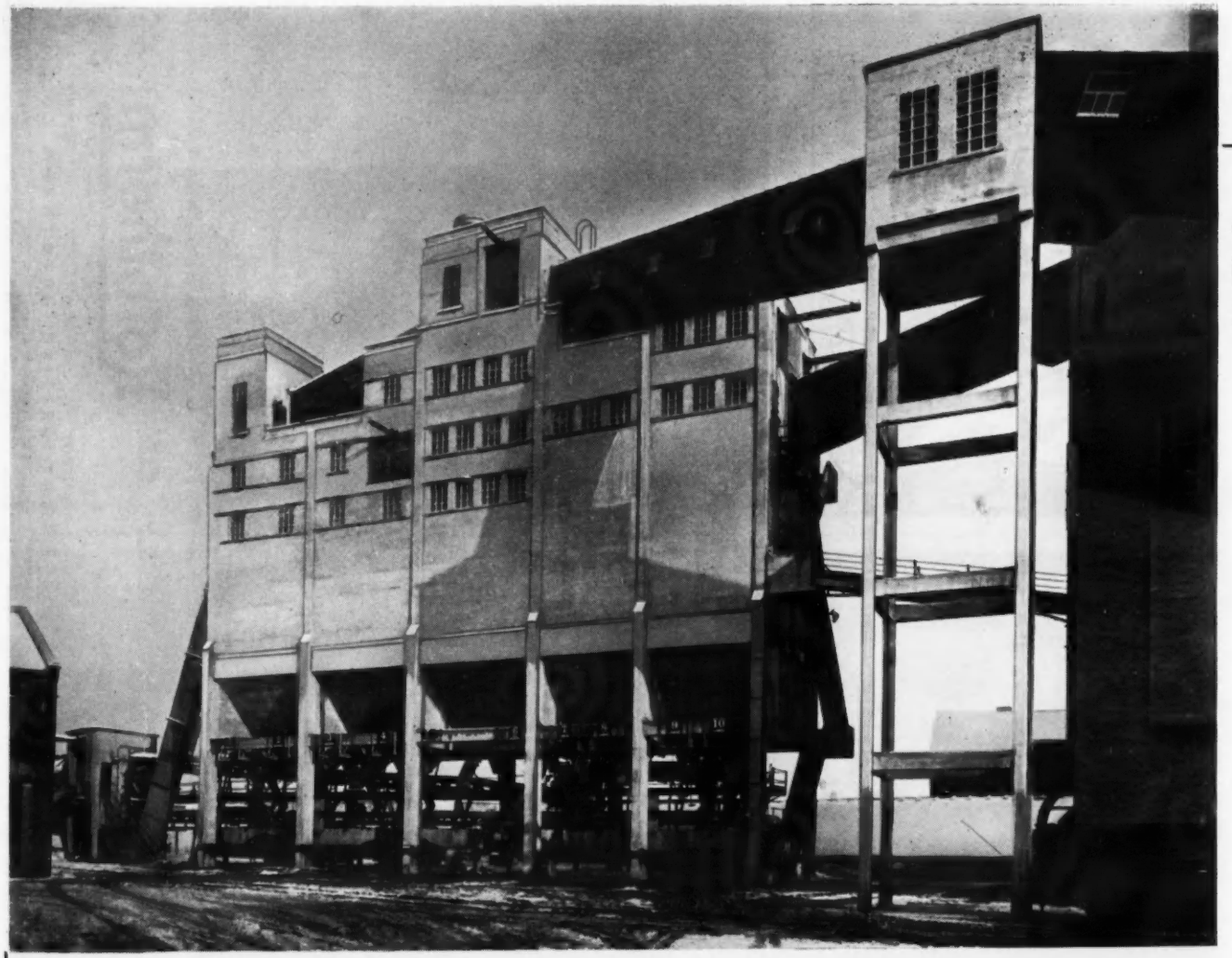

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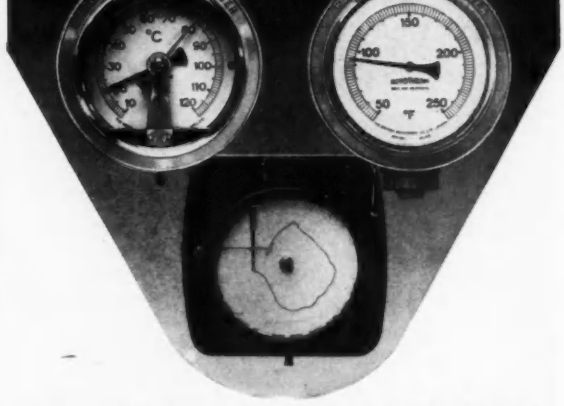

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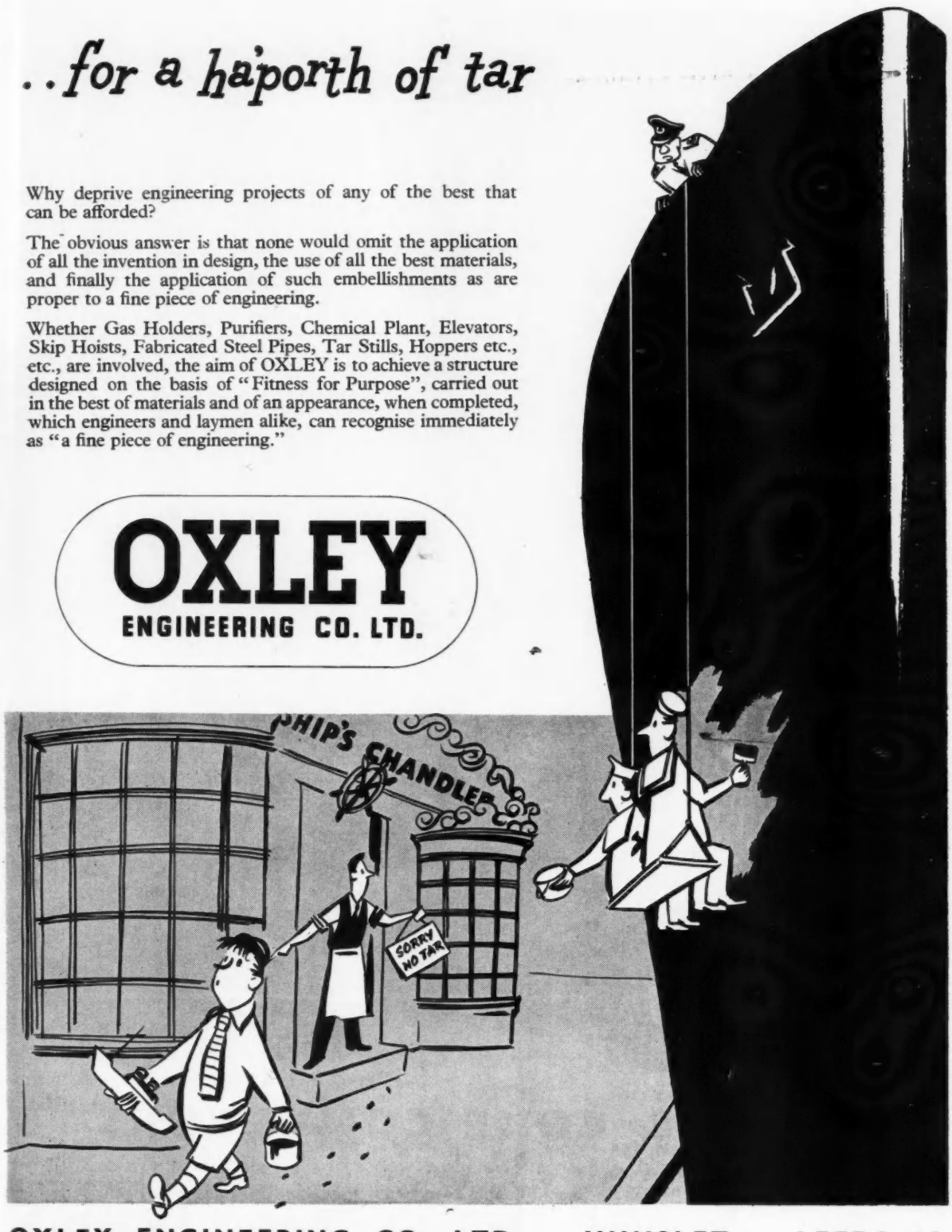

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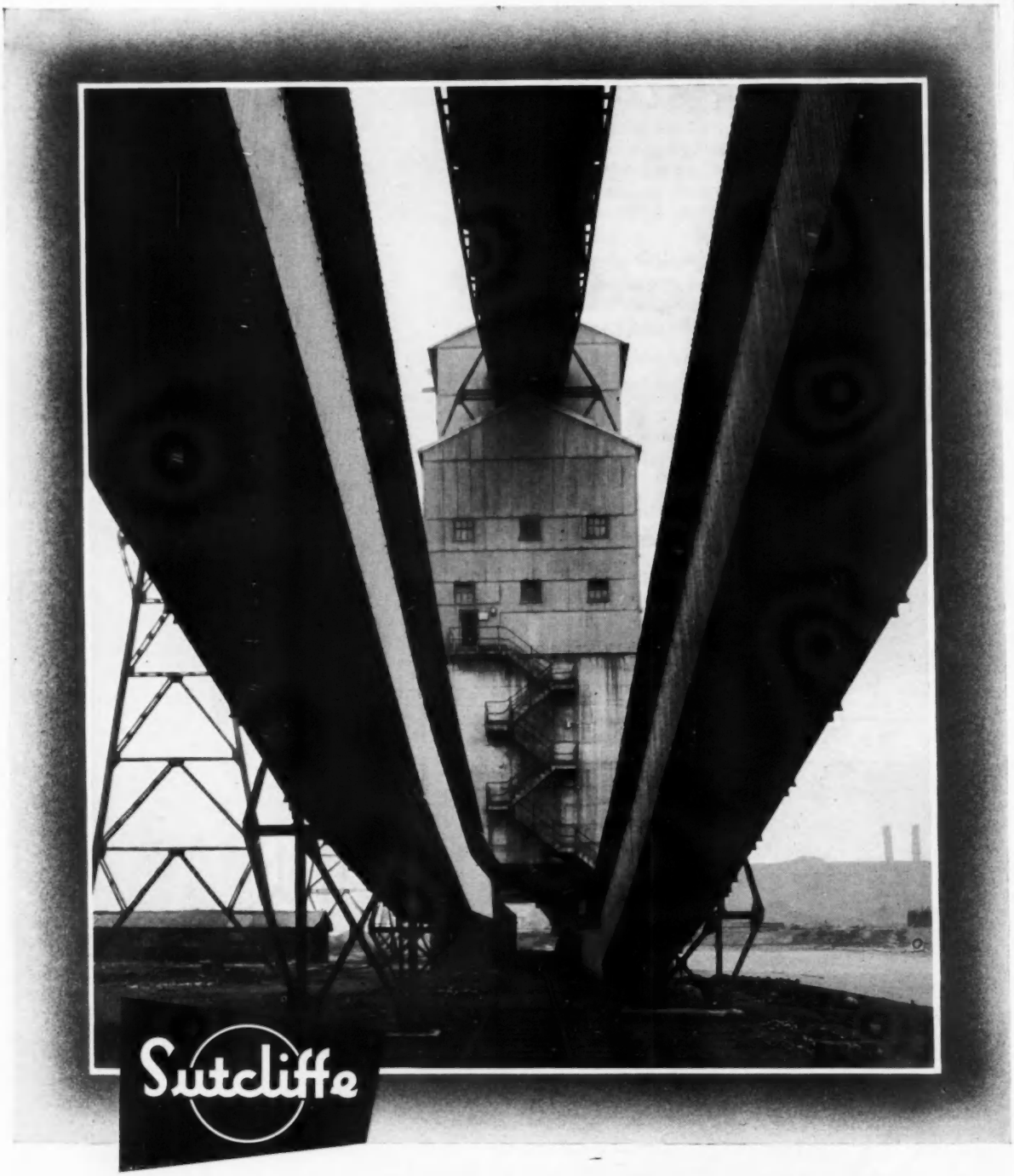

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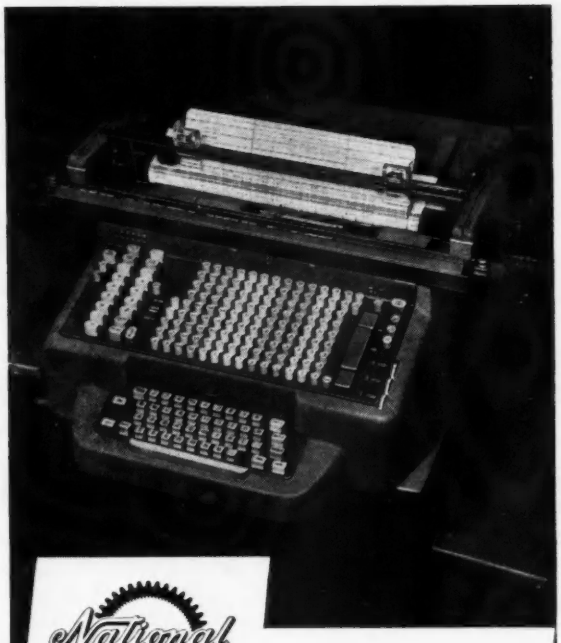

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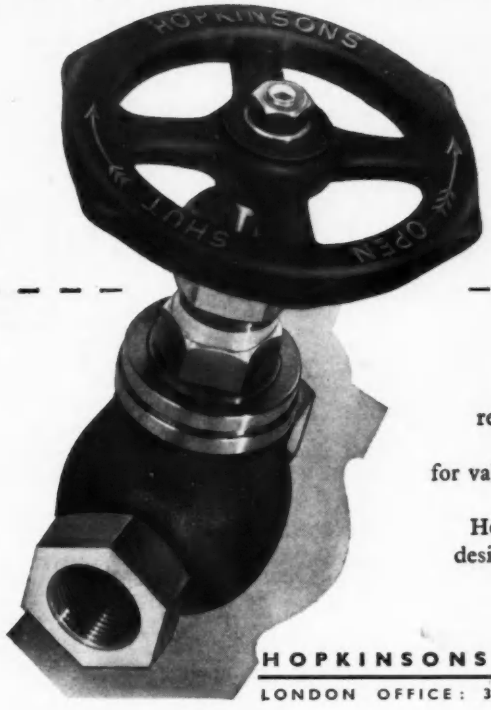

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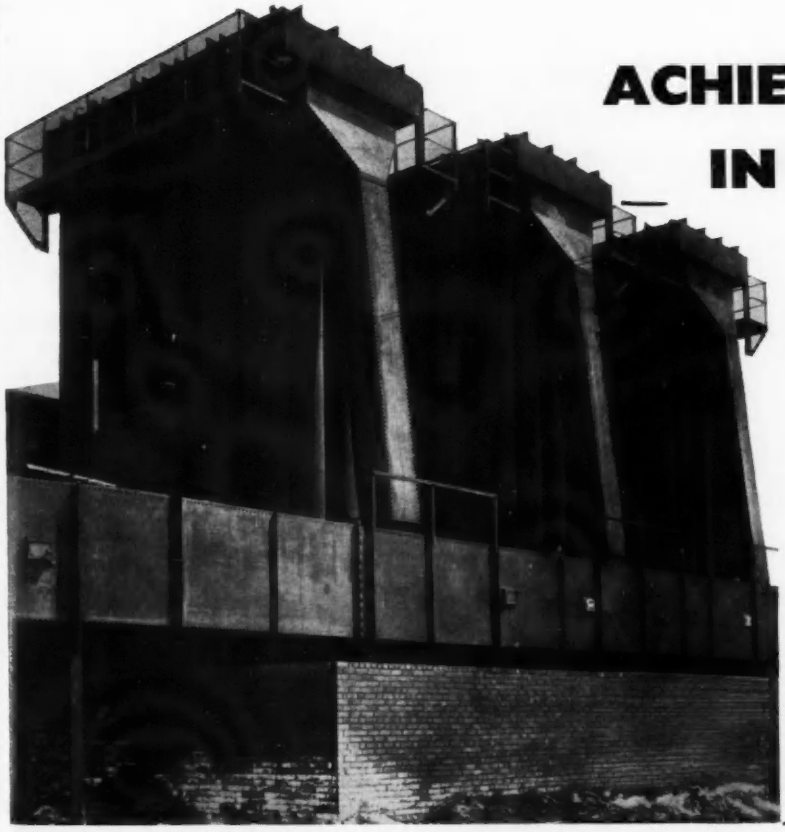

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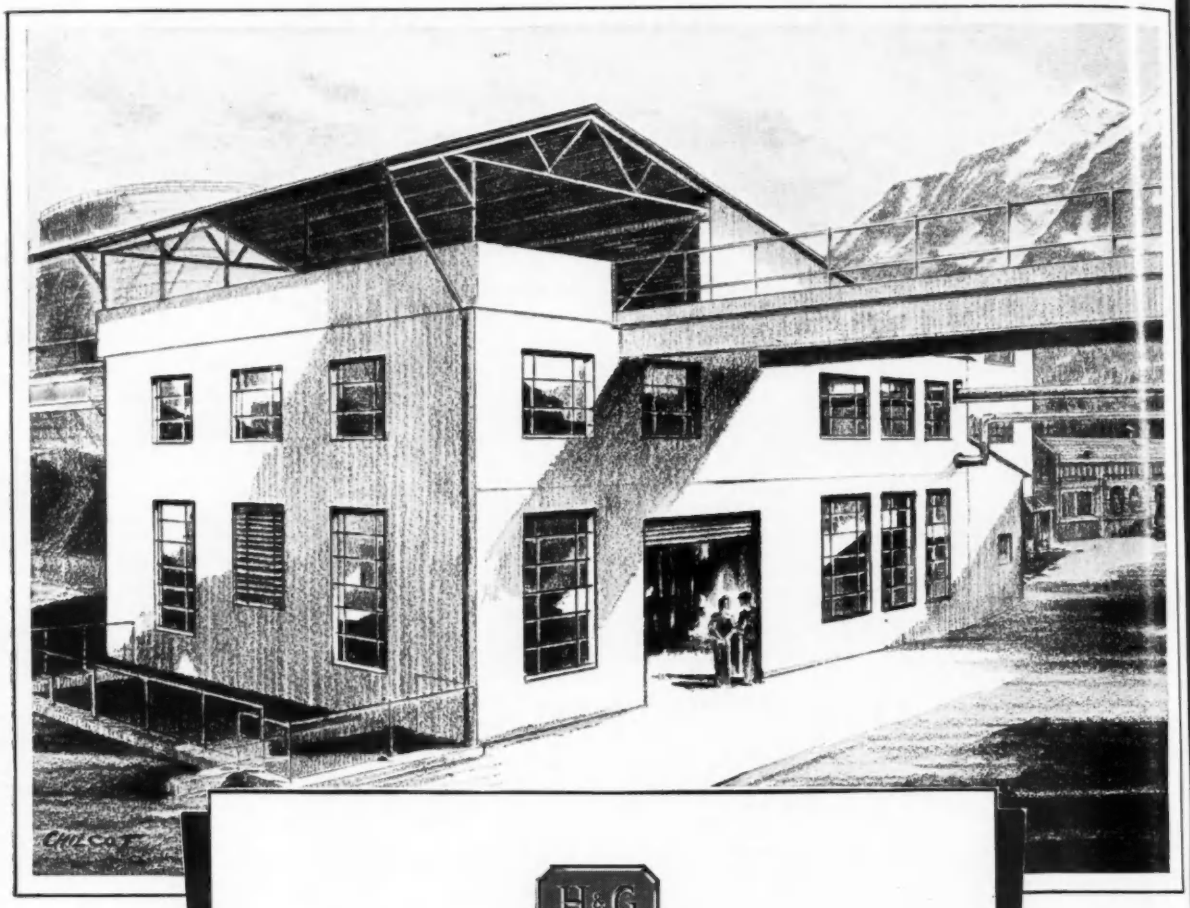

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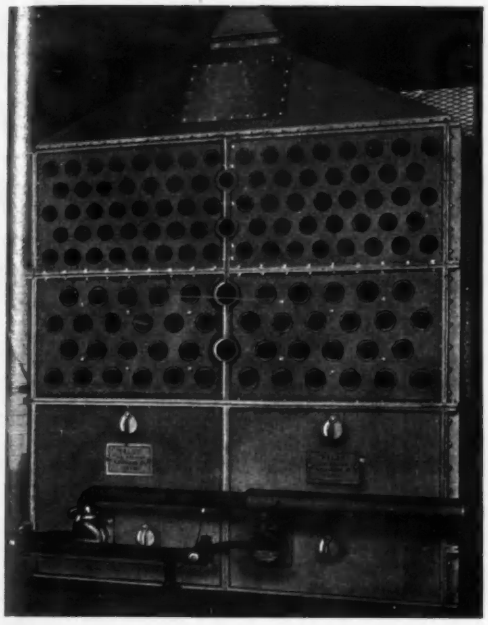

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Gas Journal

VOL. 281 NO. 4789 MARCH 16, 1955

107TH YEAR

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EDITOR: Trevor G. Williams, A.M.I.Mech.E., Assoc.Inst.Gas E., M.Inst.F.

DEPUTY EDITOR: Arthur C. Cross

Published by Walter King Limited,
11, Bolt Court, Fleet St., London, E.C.4

Telephone: Central 2236-7. Telegrams: Gasking, Fleet.

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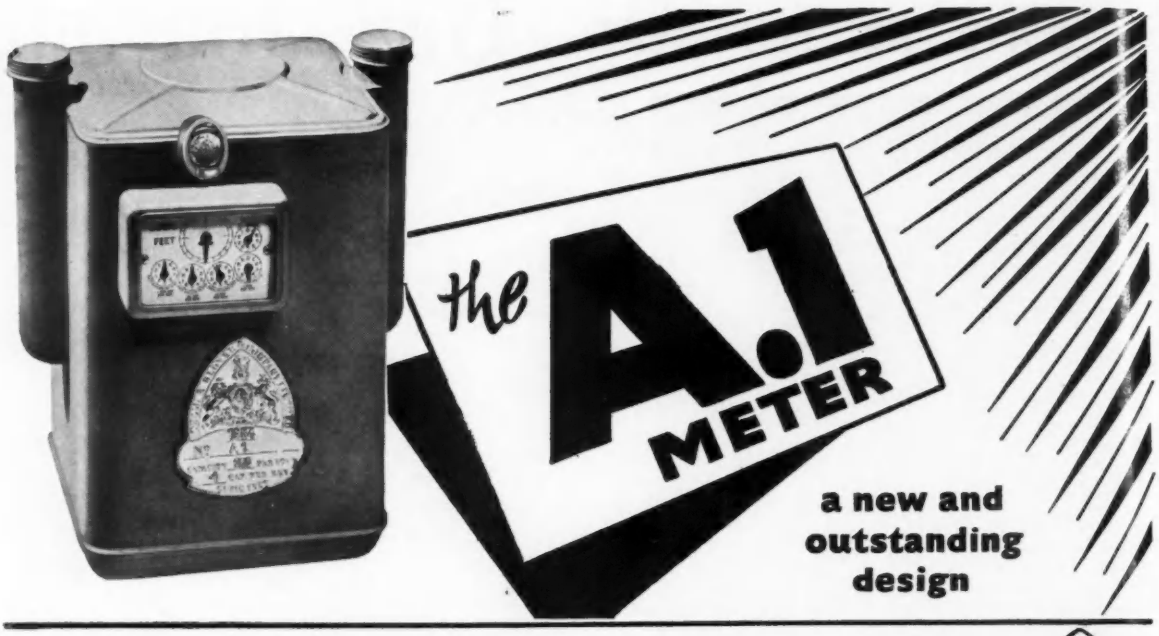

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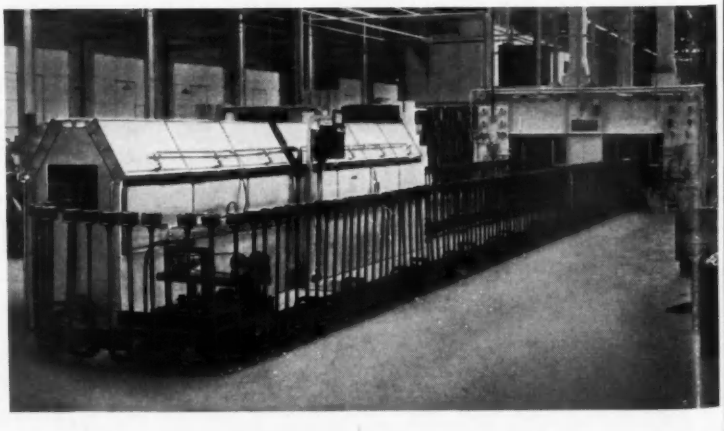

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Gas Journal

VOLUME 281. No. 4789. MARCH 16, 1955. 107th YEAR

Intermittent Verticals at Howdon

WE recorded the opening of the important gas-works at Howdon, Newcastle-on-Tyne, with a description of the plant, three years ago in our issue of October 1, 1952. Mr. H. Waiton's paper, substantial extracts of which are reproduced in the present issue (p. 715), is a most valuable account of experience in the operation of the vertical retorts and will be read with close attention and great interest by carbonizing engineers. As Mr. Waiton says, the plant is still in the new stage, but has run for a sufficient length of time to reveal the character of its operation, and we are indebted to him and to the Northern Gas Board for placing this information at our disposal in so frank and engaging a manner.

One of the most valuable features of the intermittent vertical plant is the facility with which it can deal with coals broken small enough for intimate mixing or even blending. The apparatus for mixing at Howdon is adequate for the purpose and we are truly grateful for the full account of its application presented in the paper. 'The method of mixing with cubimeters . . . . achieves nothing more than it claims, a mixture and not a blend.' Some segregation did occur, but it is evident that the degree of mixing made it possible to select the most advantageous combination of the coals available and even to use a proportion of coals which, when employed alone, would give rise to considerable trouble in operation. The results are set out very fully. A good strong coke was obtained—a considerable advantage to the export market. For home consumption, we would like to know something about its ignitability and its critical air blast characteristic.

We shall be hearing a lot more about coke in the very near future. The gas industry will be pressed to produce solid smokeless fuel in greater quantities and with properties which will not be easy to ensure. Mr. W. K. Tate expressed the opinion that intermittent vertical chambers should always be used for gas and coke production from Durham coals, but overall experience would not support so definite a view. A lot of Durham coal is successfully and economically treated in the continuous vertical retort. However, if one wants a strong coke and wishes to break down one's coals sufficiently small for blending, or at least intermittent mixing, in order to dilute with non-coking coals, then there is good reason for the adoption of the intermittent vertical chamber system. Strength, however, will be accomplished with a relatively high density and some sacrifice of ignitability.

The principle of the design of the retort setting at Howdon is proved correct in practice. The flues and nostrils are so proportioned and disposed that fuel gas and secondary air supplies are varied together 'within the small limits required' by simple adjustment of the rate of evacuation of waste gases to boiler or chimney; also it was found necessary to increase combustion chamber temperatures to 1,340°C. or a little more. This we suggest is not unusual with Durham coals and the silica materials are standing up to the higher temperatures with no apparent trouble.

A good deal is said about the mechanical producers and no doubt this installation has been fully justified. At the same time, it seems a pity that they were sited so far from the settings, since this must give rise to a serious loss of sensible heat. It is suggested that the 'dark patch in the chambers at the burner wall end' is more likely to be due to the relatively low temperature, say, 420°C., at which the producer gas reaches the setting than to the circumstances mentioned by Mr. Waiton. It seems inevitable that such a loss of sensible heat must lead to high fuel consumption. The temperature of the gases leaving the producer is also pretty low, but in spite of this, a hot gas efficiency of over 81% is calculated.

The long run of the producer gas flue no doubt contributed to the relative freedom of dust from the settings and recuperators. An interesting fact is that, in spite of this, the quantity of dust is still quite appreciable. It may be doubted, however, whether any greater freedom from dust would be worth achieving or even, indeed, whether considerably more could have been tolerated. It is often claimed that the use of almost dust-free producer gas increases the life of the settings but, while, no doubt, dust in the fuel gas may lead to slagging at the nostrils and reduce efficiency in the later life of the bench, it is seldom, if ever, a major factor in curtailing the period between resetting. The fact is that, while the removal of a fairly high proportion of dust is justified on the grounds of economy in cleaning, it is not necessary in practice to push it to anything approaching complete elimination. It is interesting to note, in passing, that airborne sealing at regular and frequent intervals still suffices to keep the retorts gas-tight, thus assisting efficient operation.

There are several other points of interest in this excellent paper. There is, for instance, the rather curious discussion of the relative merits of dilution with producer gas and that by steaming. We do not know whether all would agree that 'it is generally accepted' that the former is 'the better practice.' The proof would be in the cost per therm. The figures given by Mr. Waiton are not, we think, conclusive either way. The curve shown in Fig. 5 (page 718) is quite normal. The differences in the inert content of the finished gas is not significant and the calculated efficiency of steaming (always a somewhat doubtful figure) is not abnormally low. Probably the combination of the two, as appears to have been finally decided upon, with the advantage that light steaming ensures satisfactory pressure conditions in the chambers, is good practice in this case. At any rate, it will be agreed that this combination gives a plant, 'not without flexibility.'

Mr. Waiton is justified in his conclusion that the plant is measuring up to the performance for which it was designed. He implies a word of caution to those who proclaim their 'therms per ton' without very full information about the coals carbonized. It is astonishing how often one still reads of responsible and knowledgeable people assessing works' results in these terms without applying the necessary qualifications. In this case 'therms per ton' are to be read in conjunction not only with coal properties but with benzole extraction. Presumably, the latter would bring the thermal yield up to something like 81.4 therms at 475 B.Th.U. per cu.ft., with coals running up to 12% ash plus moisture—a good result.

We repeat that this paper is already of considerable value. We look forward to the redemption of Mr. Waiton's half-promise to give us 'the final verdict' on the problems of this fine plant when it shall have passed out of 'the new stage' into the more mature condition of an installation with a more prolonged good record behind it.

'Expansion or Explosion'

FROM time to time a book is published which strikes a new note, which makes one stop and think, which opens up a whole vista of new ideas. Such a book is 'Expansion or Explosion' by Antony Vickers, just published by the Bodley Head, Ltd., at 6s. net. Everyone of us is aware, deep down, that there is somthing wrong with the world today, a lack of harmony between nations and between the sections of a nation—fear and suspicions are as rife in these days as ever they were before 1914 and 1939, despite our fervent hopes for a happier dispensation after the recent carnage. The trouble is that we cannot accurately define the causes of this international malaise; to say that it is a conflict between political ideologies is merely to beg the question. It does not tell us why nations fear and distrust each other and why we in Britain have fallen short of the fulfilment of those ideals and plans with which we hopefully entered the postwar period.

In his book, Mr. Vickers propounds a solution to this, 'the vital problem of the machine age,' and his solution forms a thesis which is both exciting and instructive to read. In effect, the author suggests that many of the fundamental tenets of our present economic system are unsound; even further, that they are dangerous in that they are bound to lead to international rivalry in trade. He is deeply concerned that, since economic rivalry between nations eventually leads to war, and as weapons of wholesale destruction are now a ghastly reality, civilization just cannot support another major conflict and survive. He has therefore asked himself how this rivalry comes about. In an age when scientific invention and technical skill have placed the riches of the earth within our grasp, why is it that production is so often restricted by artificial means? To this and other similar questions, Mr. Vickers has an answer.

One of the main points in his thesis is that money, far from being the servant of the complex community which comprises the modern state, has become its master, and an evil one at that. Instead of being merely a passive agent in the transaction of a nation's business, it has become a commodity which can and does dominate the whole of society. According to Mr. Vickers, this dangerous situation has come about largely through a totally wrong attitude towards the interpretation of economics in the life of the nation. To the man in the street, the fundamental laws of economics are veiled in mystery except in so far as they apply to his personal affairs, and it might surprise him to know that 'the Banks lend by creating credit, they create the means of payment out of nothing'. This remarkable statement from 'Expansion or Explosion' is on the authority of the *Encyclopædia Britannica*. An even more significant quotation is given a little later in the author's chapter on economics. This comes from Mr. Mackenzie King, former Prime Minister of Canada who, in 1935, said 'Until the control and issue of money and credit is restored to the Government and recognized as its most conspicuous and sacred responsibility, all talk of the sovereignty of Parliament and of Democracy is idle and futile' Mr. Vickers contends, therefore, that it is quite wrong for the great banking institutions to enjoy the power to increase or decrease the supply of money by virtue of their deposit systems, a power which, in his view, as in Mr. Mackenzie King's, should vest only in the Government. By this latter means, he avers, the creation and issue of new money in the right quantity will be carried out on a sounder and more consistent basis than hitherto.

Perhaps even more important than the purely monetary aspect of this problem, although closely related to it, is our attitude towards the production and consumption of goods and services. The time-honoured reaction of Governments to any particular set of economic circumstances has been to plan consumption on the basis of production. This is where the mistake is made, says the author of 'Expansion or Explosion'. The sound policy is to increase consumption rather than to restrict output; while the country's productive capacity is not at full stretch, it is stupid to reduce that capacity by limiting the power of the people to buy the goods and services they obviously need. There is no doubt in Mr. Vickers' mind that we have a long way to go in this country before our production is at its maximum. Although we have so-called full employment, those in jobs are not giving 100% of their possible output; in some of the nationalised industries, 'instead of the dole and unemployment, there are full wages and hidden unemployment'. One of the features of the present economic

system is the pegging of wages to the cost of living index. When this index shows an increase—as it has done steadily for years—then wages are increased in relation to it. Clearly, this gives rise to an inflationary tendency and one which is unlikely to end until a new approach is made to the problem. In his book, Mr. Vickers makes the fascinating suggestion that, when the cost of living index falls, wages should be increased and *vice versa*—the *vice versa* is nicely chosen since it avoids putting into words the more unpleasant contraposition—*i.e.*, that when the cost of living index rises, wages should be decreased! No one would deny that this is a daring suggestion and one that implies a lot of re-thinking by very many people.

Space does not permit us to comment as fully as we would wish on all the important issues raised in this book but, if in these few paragraphs the interest of the reader has been sufficiently aroused to make him want to read the book, then a useful purpose will have been served. 'Expansion or Explosion" faces squarely the critical questions of our times and makes a serious attempt to understand and solve them. As an engineer, with an engineer's directness of approach and, as a man of action, Mr. Vickers sees the problems and wants to do something about them. It is to be hoped that his book will be widely read by all sections of the community for it contains a message that concerns each and every one of us.

FUEL FOR TWENTY YEARS

ALMOST all supplies of energy in the United Kingdom are derived from coal and oil. A very small amount (less than 1% of total energy consumption) of electricity is generated by water, and in the more distant future atomic energy will undoubtedly make a substantial contribution. But for practical purposes it is safe to say that for the next two decades at least these are the two main sources of industrial power. Under the title of *Fuel for Twenty Years,* P.E.P. (Political and Economic Planning) has published a 2s. 6d. booklet in which it shows that in the next 20 years an increasing proportion of the energy consumed in this country must come from oil, principally fuel oil, and discusses industries in which oil could replace coal, the conditions that would make this possible, and the problems that such an adaptation would cause. Referring to the gas industry, it says that it is estimated that within two years the 13 plants equipped for making gas direct from heavy oil will be saving nearly half a million tons of good quality coal. With hopes of finding natural gas and using refinery gases it is probable that gas will not require very much more coal in the future than it is using at present; it may even require less.

One of the problems of oil refining is that of joint supply. The refineries obtain a number of products from crude oil, and in raising the production of fuel oil to meet national demands they will also increase their output of other things, the most important of which is petrol. What is to be done with this extra petrol? The rest of Europe is faced with the same difficulty, and there is little hope of exporting the surplus. The review therefore turns its attention to ways and means of stimulating the demand for petrol for private use. Could the price of petrol be cut enough to clear the market? If the problems of joint supply cannot be overcome, the oil companies may be forced either to restrict their flow of products to the level where all can be sold, or may face heavy bills for new capital equipment to enable them to alter the nature of their output to allow supply to be adjusted to demand. Can the Chancellor of the Exchequer do anything? The tax could be cut, but the problem then would be to sell enough extra petrol to maintain total revenue. Would people buy so much petrol? Another way of making private motoring more attractive would be to make substantial improvements in the road system and to improve facilities for cars within towns of all sizes, and not only between towns. The present road building programme will not help in this direction for a considerable time. The wooing of the private motorist may seem to have little connection with problems of supplying energy for industry, but as the booklet shows the two things go hand in hand.

SURVEY

EVERY area board has recognized, from the earliest days of nationalisation, the importance of conveying economic and statistical information not only to officials and staff but to the consultative councils, the local authorities and other organizations concerned in nominating or appointing representatives, and all whose interests are related to the operation and services of the gas industry. Official reports, which in any case could not meet the need, are issued only once a year, promotional advertising touches only selected aspects and avoids 'problems,' and house magazines are unsuited to the purpose. The North Western Board led the way with its *Quarterly Bulletin,* a never-failing source of information not only about what is happening within the area but about the operations of the gas industry nationally. Nothing quite like it, so far as we are aware, has been produced by any other board, but credit must be given to all those area board chairmen and chief officials who have always been ready and willing to attend consultative council meetings in person and provide whatever information has been desired. Some have made it almost a rule to attend every meeting; others have said they would come whenever they were invited, and have kept their word. But printed information has not been so readily available.

We are glad, therefore, to welcome a policy of giving a regular service of information as expressed in the inauguration by the East Midlands Gas Board of a thrice-yearly review called *Survey.* No. 1 is a 12 pp. review of gas manufacture since vesting date, an account of the economic growth of the area since 1945, and a survey of activities in the first nine months of the current financial year, backed by a map showing the progress of grid mains and interlinking schemes. 'In present day conditions, when economic circumstances are continually changing,' writes Mr. Sydney Smith, Chairman of the Board, 'it is essential that public bodies such as ourselves should make known the background information by which the public may form sound and honest judgments of their work. The annual reports are the principal means by which such information is provided, but they are reports to Parliament and are designed for a different purpose. *Survey* is offered rather to meet the needs of those organizations more closely concerned with the Board's activities. The Board is of the opinion that a series of similar reports presented regularly throughout the year, summarizing trends and commenting on them, will be of value. They will enable our work to be followed more closely and will provide a background by which the annual reports may be judged.' It is the intention of the Board to issue *Survey* in March, July, and November in each year, reviewing progress over the preceding nine, 12, and six months respectively, with permanent sections covering sales, production, distribution, and costs, and a short report of major items of interest in the four divisions.

Personal Notes

MR. J. W. ATKINSON, Skipton, a retired gas maintenance fitter and a former member of the Skipton Fire Brigade, is to contest the forthcoming West County Council election in the Skipton division as an Independent candidate against the sitting Labour member, Mrs. M. P. Banks.

MR. D. H. ROUSE, whose appointment as Divisional Manager of the Western Division of the North Thames Gas Board was recorded in the 'JOURNAL' last week, joined the former Gas Light and Coke Company in 1925 as an apprentice in gasfitting; it can therefore be said that he has worked his way up 'from the ranks.' On completion of his apprenticeship, Mr. Rouse worked on the fitting side until, in 1932, he was transferred to instructional duties at Watson House. Seven years later he became Service Supervisor at Kensington, and from 1943 to 1946 served with the Royal Air Force on flying duties. After demobilization he was Service Supervisor at Chiswick, Richmond, and Westminster. In 1949 he was transferred to Divisional headquarters at Ilford. In 1950, Mr. Rouse was appointed Commercial Assistant to the Eastern Divisional Manager, and six months later was transferred in the same capacity to the Central Division at Westminster, the post he held until his new promotion.

MR. A. L. HOUGH, whose retirement from the post of Local Manager of the Goswell Road and Rathbone Street offices of the North Thames Gas Board was recently reported, was presented by Mr. A. F. Hetherington, Central Divisional Manager (lately appointed Commercial Manager of the Southern Gas Board) with a portable wireless set and a travelling bag for his wife. The gifts had been subscribed for by Mr. Hough's many friends and colleagues who were there to bid adieu to their old chief. Mr. Hough's career in the gas industry had been long and varied. He entered the service of the former Gas Light and Coke Company in 1911 as a shorthand typist in the days before the Company employed females. He later became a fitter's mate and then an auto arranger before joining up in the first world war with the King's Own Yorkshire Light Infantry. After the war, Mr. Hough returned to the Company and through the years became Assisting Inspector, Inspector, and Inspector-in-Charge before becoming Local Manager in 1936. Mr. Hough has been in charge at Goswell Road and Rathbone Street since 1941. He has been a member of the Finsbury Rotary Club for many years and was formerly on the Executive Committee of the Bethnal Green Chamber of Commerce.

MR. F. J. BREWER, London Manager of Parkinson and Cowan Gas Meters, has been appointed a Divisional Director of that Company.

MRS. D. KENNEDY and MISS M. FREW, M.B.E., the first President and Vice-President, respectively, of the Dunfermline (Fife) branch of the Women's Gas Federation, have been made the first honorary members.

MR. J. FERGUSON has been appointed Chairman of the Dunfermline branch of the British Gas Staff Association, and MR. J. MCCONVILLE, Kelty, Secretary and Treasurer. Mr. McConville is also staff side representative to the Scottish Area Council, Glasgow.

COUNCILLOR JAMES HARKIN, who is to be the next Mayor of Batley (Yorkshire), is a collector with the North Eastern Gas Board. He has served more than five years on the Council and is Chairman of the Watch and Parliamentary Committee and a past Chairman of the Waterworks Committee. From 1946 to 1949 he was a member of the West Riding County Council, and has been a Justice of the Peace since 1950.

MR. R. M. FARROR, M.I.MECH.E., Divisional Engineer, West Surrey Division, has been appointed Assistant Chief Engineer of the South Eastern Gas Board. For the time being he will retain his present appointment and continue to work from his Wandsworth office, but later in the year, when further office space is available for the Chief Engineer's Department Mr. Farror will move to headquarters at Croydon. He joined the Wandsworth, Wimbledon, and Epsom District Gas Company in 1926 as an articled pupil to the late Colonel C. M. Croft, and was appointed Works Manager at Wandsworth in 1935. Three years later he became Assistant Engineer (Production) of the Wandsworth and District Gas Company, and was made Assistant Chief Engineer of that Company in 1945. When the gas industry was nationalised in 1949 Mr. Farror was appointed Engineer of the West Surrey Division.

William Sugg & Co., Ltd., heating engineers, have formed a £150,000 subsidiary, Sugg Solar, Ltd., in partnership with Solar Aircraft Co., of San Diego, U.S.A. The new subsidiary will manufacture gas turbines for military and industrial uses. It is the first American gas turbine to be licensed in Britain.

Three Generations of the same family work in the same department at the Goswell Road distribution depot of the North Thames Gas Board. They are the Speakman family—grandfather Arthur, trunk mains foreman, who has been with the Board since 1909, son Arthur who has 25 years service on the distribution side, and grandson John (three years service) who is engaged on governor maintenance.

Correspondence

WEEK-END SCHOOLS FOR GAS STAFFS

DEAR SIR,—You reported in the 'JOURNAL' of March 2 (p. 595) that a speaker at a week-end school for gas staffs, organized by the National and Local Government Officers' Association, stated that the school was of some historical significance, claiming it to be the first week-end school for gas staffs to be held in this country. Readers of the 'JOURNAL' and, in fact, gas staffs throughout the country, will know that week-end schools for gas staffs have been a regular feature in the affairs of the British Gas Staff Association for several years, such schools having been held in six areas so far.

We consider these schools to be of great value, enabling as they do, the staffs to meet Board chairmen and senior officials informally. We, therefore, congratulate the East Midlands Committee of Nalgo on arranging what may well have been Nalgo's first gas staff week-end school and trust that it was as beneficial as those previously organized by the B.G.S.A.

Yours faithfully,
F. C. HENFREY-SMITH,
General Secretary.

British Gas Staff Association,
203, Knightsbridge, S.W.7.

March 3, 1955.

Diary

March 17.—MIDLAND JUNIORS: Visit to Stafford Gasworks.

March 18.—SCOTTISH JUNIORS (EASTERN): Jubilee Dinner, Adam Suite, George Hotel, Edinburgh.

March 25.—MANCHESTER AND NORTH OF ENGLAND SECTIONS, I.G.E.: Joint visit to Tingley Gasworks, followed by Centenary Dinner of Robert Dempster & Sons, Ltd., Elland, at Queen's Hotel, Leeds.

March 25.—WALES G.C.C.: Guildhall, Swansea, 2.15 p.m.

March 26.—WESTERN JUNIORS: Works visit and paper by R. Miller (W. J. Jenkins & Co., Ltd.). Bude.

March 29.—NATIONAL INDUSTRIAL FUEL EFFICIENCY SERVICE and COMBUSTION ENGINEERING ASSOCIATION: Conference on 'Fuel Efficiency Pays' at National Factory Equipment Exhibition, Earls Court, 10.30 a.m.

March 31.—MIDLAND JUNIORS: President's Day at Wolverhampton.

March 31.—NORTH THAMES G.C.C.: Kent Room, Caxton Hall, Westminster, 2.30 p.m.

April 1.—LONDON JUNIORS: 'Oil Gas,' W. J. Walters, 178, Edgware Road, London, W.2. 6.30 p.m.

April 5.—MIDLAND JUNIORS: 'Gas Central Heating and Hot Water,' W. Walling. Birmingham.

Early Experience with a New I.V.C. Installation*

A view of the recuperator side of one bench at Howdon Works.

By H. WAITON, ASSOC.M.INST.GAS E.†

THE new Howdon Works§ has now been producing gas for three years. It is not, therefore, intended to describe the plant but to recount some of the interesting experiences encountered during routine operation and the results obtained since the plant settled down. All figures are extracted or derived from records compiled in the course of normal routine and observation.

The carbonizing installation consists of four benches each having 18 C.O.L. intermittent vertical chambers of four tons capacity, and the whole is capable of carbonizing 540 tons of coal per day. Heating of settings is by means of four hot gas external mechanical producers.

The production capacity of the works was designed to be 8 mill. cu.ft. of coal gas after producer gas dilution, plus 4½ mill. cu.ft. of C.W.G., to give a total of 12½ mill. cu.ft. at 475 B.Th.U. per cu.ft. Gas requirements have made it possible to keep within these figures for all but short periods in mid-winter and the plant has not been taxed to any great extent. When extra effort was called for during the cold weather at the beginning of 1954 the average daily production over a continuous period of 18 days was 13,515,000 cu.ft. and this after 2½ years of uninterrupted working.

Though the plant was conceived and is operated as a base load installation, the combined carbonizing and diluent plants are not without flexibility and can be geared up or down within 48 hours between 8.18 mill. cu.ft. per day on a 12 hour charging schedule and 5.5 mill. on an 18 hour schedule, extracting benzole at 2.4 gal. per ton of coal carbonized in each case. By suspending scurfing and benzole extraction to allow the maximum addition of producer gas diluent a figure of 9,069,000 cu.ft. has been obtained, which when added to the output of the C.W.G. plant, which was also being pressed, gave the record day's production figure of 14,279,000 cu.ft. For the purposes of this paper all volumes are corrected to S.T.P. and thermal yields are calculated on that basis.

After initial disappointments the coke quality was improved and became a popular choice with buyers, particularly in the Scandinavian countries. From April, 1952, to September, 1954, 143,320 tons of coke were sold for export and stocks of coke on the works have never been unmanageable.

In the early stages it was difficult to strike a balance between coke quality and thermal yield with the coals which were available. The initial mixture decided upon was 80% Durham gas coals and 20% Northumberland steam coals, the object, apart from price considerations, being to counter the highly swelling characteristics of the former with the lower swelling propensities of the latter sufficiently to allow their use in I.V.C.'s, without losing gaseous thermal output. The resultant coke was not satisfactory, being rather weak and friable. Several chambers were charged first with each of three Durham coals alone and later with a mixture of them all, though not from the same consignments. The ease, or otherwise, with which the coke was discharged was noted and the different cokes were kept separate and examined.

The carbonizing period was 14 hours and combustion flue temperatures ranged from 1,320°C. average maximum temperature to average 990°C. in the top traverse. The coke from the Holmside coal was excessively hard, probably partially due to an extra 1½ hours carbonizing time, because the charges, without exception, hung in the chambers and were only liberated after much poking. The Boldon coke was hard but less so than Holmside, and no difficulty was found in discharging it from the chambers. The Wallsend coke was as hard as the Boldon and was also discharged easily. Less conclusive results were obtained from the mixture, the coke being of a more heterogeneous nature than were the cokes from the component coals carbonized separately. The impression was that segregation of the coals had taken place. The charges, however, dropped easily from the chambers. No shatter test apparatus was available at that time nor was it possible to keep separate the gas from these charges.

Carbonization of Northumberland coals was discontinued as from May, 1953, and the percentage of Holmside coal reduced to approximately 10%. The result was an improvement in coke strength and pore structure and a distinct reduction in the amount of beans (¼ to ½ in.) and breeze in proportion to the coke made.

Prior to and during the above tests the coal was crushed to below 2 in. and no screening figures are given because large variations in the amounts of smalls in the coals as delivered led to varying amounts by-passing the breakers. An average of 70% below ½ in. would be a fair estimate. Only No. 2 breaker could be altered to crush smaller without radical changes and after modification a figure of 87% below ½ in. was obtained, with 58% below ¼ in. and 35% below ⅛ in. This smaller coal was carbonized exclusively in No. 2 house for some time.

Briefly summarizing the results of work on coal and coke; whatever the mixture of coals used the more finely crushed coal has given a better coke so far as texture and resistance to shatter is concerned, while the exclusion of Northumberland coals reduced the density and friability.

The coke and breeze produced per ton of coal carbonized in the year ending March 31, 1954, were 12.92 and 2.38 cwt. respectively. Though the breeze figure appears rather high

* From a paper submitted to the general meeting of the North of England Section, I.G.E. on February 24.

† Tyneside Division, Northern Gas Board.

§ The plant at the Howdon Works of the Northern Gas Board was described in full in the 'JOURNAL' October 1, 1952, page 38.

Fig. 1. Travelling cubimeters under coal blending bunkers.

it should be noted that much of the coke is passed through a breaker and all coke sold and used is debreezed at both inlet and outlet hoppers, while breeze recovered from the quenching pits is very wet.

Coke Cars

Quenching arrangements were not and indeed are still not, considered satisfactory. The amount of water required for quenching in the coke car is controlled by a timing device which can be accurately adjusted, but the shape of the coke car is not conducive to uniform quenching. The vertical cross section through the car is triangular, thus the coke lying in the bottom angle cannot be quenched without overquenching that in the upper zones. It is believed that better results would be obtained by using shallow cars but the difficulty of incorporating suitable electrical equipment for tipping, which would then be a necessity, has precluded an easy solution. The prototype of such a car is now awaiting assembly. In the meantime slight underquenching of the charge in the car is practised and any hot coke appearing after tipping is spot quenched on the wharves.

All recoverable water runs to concrete settling tanks from which it weirs to collecting tanks to be pumped back to overhead tanks for further use. The settlings are removed from the first named each day by means of a mobile crane and grab.

Maintenance of coke cars has not proved as heavy as expected and has mainly been confined to renewal of lining strips. Actual repairs and maintenance costs are not available but it is estimated that £1,000 per annum would cover the four cars.

Examination of Tar

At about the same period as the coal tests and with similar carbonizing conditions obtaining, viz., 14 hour period and 1,320°C. maximum combustion flue temperatures, the tar was examined and figures were given in the paper.

Consideration of the figures show the free carbon and pitch contents to be on the high side. On the other hand the distillate to 350°C. contains a rather high percentage of paraffins and open chain compounds. The naphthalene content (not estimated) would probably not be more than 2 or 3% calculated on the dehydrated tar. While the quantity of pitch obtained would seem to indicate that some overcracking of tar vapours had occurred in the chambers, the nature of the distillate to 350°C. conveys the opposite impression. The tar, in fact, may be regarded as a mixture, part of it having escaped from the carbonizing zone at a relatively cool temperature and part having been subjected to severe heat action. This is consistent with carbonizing in I.V.C.'s which are fitted with bottom gas offtakes in addition to the normal top offtakes. The make of tar per ton of coal carbonized is 11.98 gal.

Control of the Carbonizing Plant

The control of the carbonizing plant cannot be said to have given much cause for anxiety. For some months after gas-making commenced, external conditions, over which the management had no control, made it necessary to alter the carbonizing period frequently, and it was virtually impossible to maintain stable conditions long enough to assess results. When it was possible to settle down to 13.2 hours carbonizing time it became evident that the makers' recommended maximum flue temperature of 1,300°C. was not sufficient. Thermal yield was unsatisfactory and the percentage volatile matter in the coke was too high. It was known that the chamber walls of the Howdon plant were 4 in. thick throughout, the panels not being recessed on the reverse side as is the case in some similar installations, and it was evident that the effect on heat transference was more marked than had been anticipated. On consultation, the makers agreed to the raising of maximum temperatures to 1,340°C. with proportionate increases in the upper flues and ending at 1,000°C. at the top. The results were gratifying and later when the plant settled down to base load production with a carbonizing period of 12.3 hours, temperatures were progressively raised to 1,360-1,370°C. with no apparent detrimental effect on the silica.

Flue Cleaning

Undoubtedly the greatest factor contributing to the success in maintaining high carbonizing temperatures at a steady level over long periods has been the low dust content of the producer gas. After three years there is hardly a trace of dust in the combustion flues and they have never required cleaning. The records show that the nostril dampers have been cleaned five times in the same period. The only parts of the settings which need regular attention are the producer gas ducts. They are cleaned at intervals of eight weeks. The deposit in them is black and of a sooty consistency containing over 80% fixed carbon and it lies on the floor of the duct to a depth of about 1½ in. If disturbed the dust travels easily with the producer gas and burns almost completely in the combustion

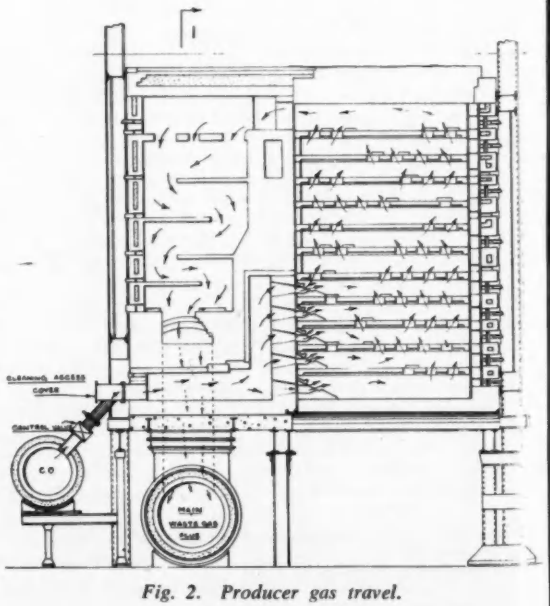

Fig. 2. Producer gas travel.

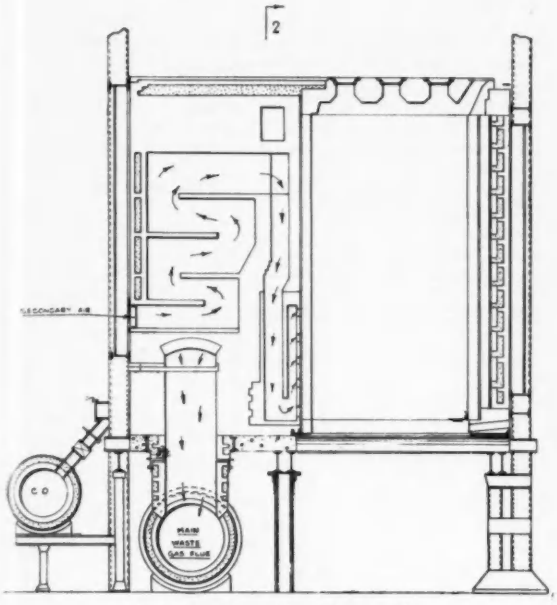

Fig. 3. Secondary air travel.

flue to a residue which remains airborne and is carried through the setting. Even this small potential nuisance has been largely eliminated by the introduction of the practice of cleaning the gas ducts by suction.

The recuperators have only been cleaned once, after 26 months working, when the depth of dust lying on the bottoms of the waste gas flues varied from practically nil in the top flue to about 3 in. in the bottom one. In addition there was a film of about ¼ in. on the side walls of the lower flues which was removed by scraping a long rod across the face of the walls. This dust contained some airborne sealing powder and the bulk of it was carried away through the chimneys when disturbed. No sign of slagging was observed. The amount of dust in relation to the size of the flues could hardly have impaired the efficiency of the recuperators and it is not expected that they will need cleaning again until the chambers are due for resetting. To date a layer of dust of average depth about 2 in. has accumulated on the floors of the waste gas mains. It is difficult to assess the degree of deposition in the mains between the producer plant and the settings because of the virtual impossibility of collecting the dust when removing it through the cleaning holes.

It is estimated that approximately 12 tons of dust per annum, or 0.035% of the coke charged to producers, is deposited in the system after the producer plant dust catchers. In the two year period ending March 31, 1954, the cost of dust removal was approximately £380—equivalent to 16.68 pence per mill. cu.ft. of coal gas and diluent gas made.

Labour Requirements

It was fortunate that the operations to be carried out by labour in the new carbonizing plant were totally different from those with which the operatives had been familiar. There were no preconceived prejudices or mal-practices to be overcome. The basic routine advised by the makers has become standard practice and the number of process workers has been kept within the total estimated figure.

The total number of men employed in the chamber houses per 24 hours is 34, made up as follows:—

Shift foremen	3	(not all chargeable to carbonization.)
Stokers	18	
Hydraulic main cleaner	1	
Liquor spray attendants	2	(doing also several small jobs.)
Bottom doors, hydraulics, etc.	1	
Scurfing and airborne sealing	2	
Patching and brush patching	2	
Heats attendant	1	
Sweepers	2	
Vacuum cleaners	2	
Total	34	

To this number should be added six producer attendants making a total of 40 or five men per mill. cu.ft. of coal gas produced. Breaking down the total cost in wages into costs of the four principal functions of the labour force the following figures emerge:—

Duties	% of total cost
Supervision	2.5
Operation	79.0
Maintaining gas tightness	9.5
Cleaning plant	9.0

The cost of the third item will, of course, further increase as the condition of the chambers deteriorates with age. The number of men employed in this connection during the first two years was two, has already risen to four and is expected to reach six when refractory welding becomes necessary. It may be thought by some that the labour expended on cleaning is a little extravagant, but a clean plant indicates pride of ownership and this in turn produces good results and freedom from accident.

Scurfing Operations

One chamber per bench per day is left out for scurfing which accounts for 5% of the carbonizing capacity. In addition each chamber is left open for controlled aeration for a period of 15 minutes after every discharge. Several attempts have been made to curtail scurfing times but without success, for relatively small growths of carbon are sufficient to cause charges to hang. No doubt these limitations are a penalty for carbonizing highly swelling coals.

The fireclay zones at the extreme top and bottom of the chambers require most attention. The joints here are brush patched with a proprietary hot patching cement each time a chamber is out for scurfing while the lid seats and offtake pipe joints are similarly pointed. For the first two years airborne sealing was carried out at alternate scurfings but since

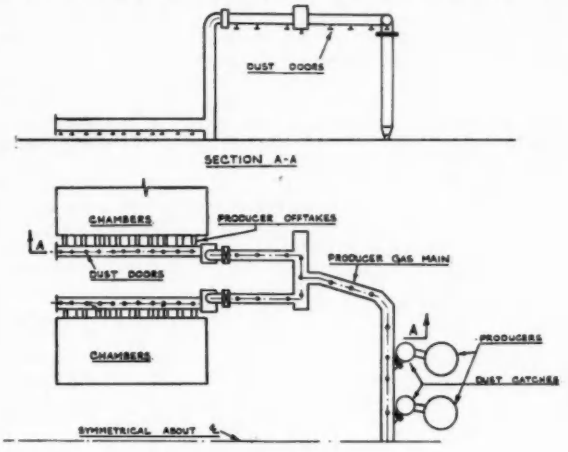

Fig. 4. Producer gas mains.

that time increasing numbers of fine cracks in the silica made it advisable to seal each time. The necessary apparatus for oxy-coal gas welding is held in stock but has not yet been required since pressures of 3 in. to 4 in. W.G. are still regularly being reached when airborne sealing. In the two-year period ending March 31, 1954, the total cost of materials for maintaining the chambers in tight condition was £1,130, equivalent to 4s. 5d. per mill. cu.ft. of gas made or 0.01 pence per therm.

Gas Production

It is generally accepted that with intermittent vertical chambers dilution of coal gas outside of the carbonizing vessel is the better practice. In the first instance it was not intended to steam the charges at all at Howdon because of the possible detrimental effect on the silica, and because of the requirements of the coke market. Furthermore the producer plant is of ample capacity to supply all dilution needs at no extra cost, except for coke, even when adding high calorific value carburetted water gas to the coal gas.

After several weeks, however, it was decided to steam lightly to ensure that pressure conditions existed in the chambers towards the end of the carbonizing period and preclude any possibility of air infiltration through bottom ironwork and charging lids. Exhaust and pass out steam at 15 lb. per sq. in.

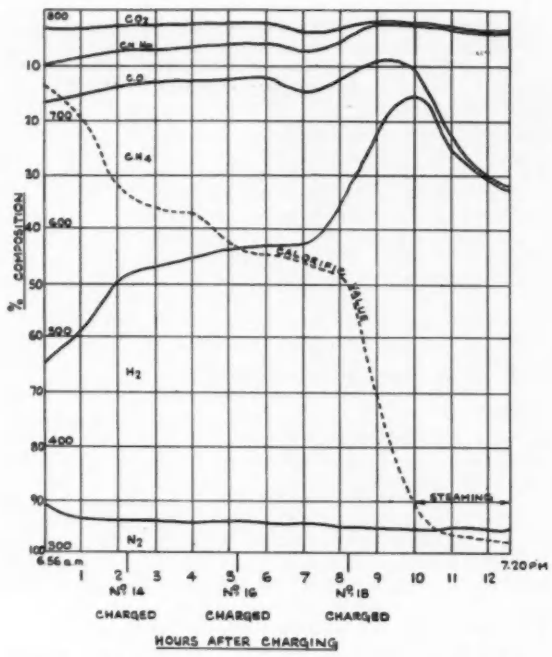

Fig. 5. Analysis of gas—top offtake, chamber No. 17c.

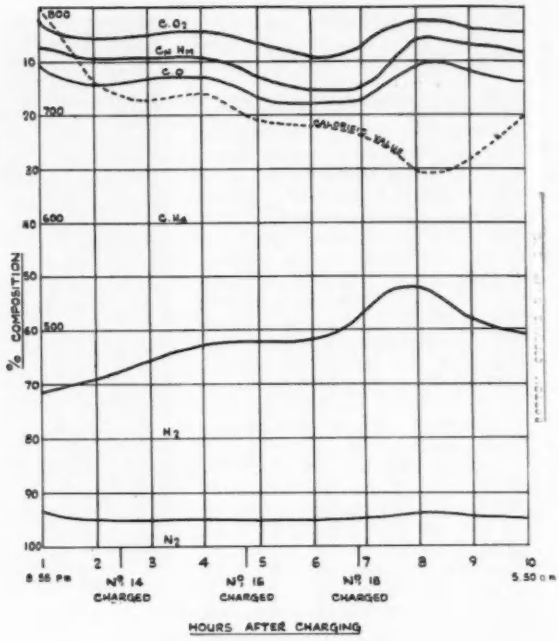

Fig. 6. Analysis of gas—bottom offtake, chamber No. 17c.

is used, controlled by fixed orifice plates inserted in the supply lines to each bottom casting. Provision is made for inserting a meter in the main steam supply to each bench for checking consumption periodically. Normally four chambers per bench are steaming, the percentage of steam to coal carbonized varying from 3.3% when carbonizing on a 12 hour schedule to 4.5% on a 13½ hour schedule. Its effect is shown graphically in Figs. 5 and 6 which also show the composition of the gas evolved from a charge during the whole time it is in the chamber. Tables of results calculated from analyses of crude gas are given in Tables I and II.

Efficiency of Steaming is calculated to be 58% decomposed.

The blast is regulated by a butterfly valve in the blast manifold, actuated by an Askania regulator to maintain a constant pressure of 0.5 in. W.G. in the producer gas bus main. Hence any change in the demand for producer gas is transmitted directly to the common blast supply. The blast saturation temperature for each unit is maintained at 54°C. by the manual adjustment of a three-way valve which directs the steam from the jacket either to the blast main or to atmosphere. There is always a small surplus to atmosphere.

Fuel normally used is the ½ to 1½ in. size, but so adaptable have the producers proved that all sizes from ¼ to ½ in. to 2 in. have been used at various times, very often with mixtures of all the sizes between. Clinker troubles are rare except when using 100% ½ to ¾ in. (beans) when there is a tendency for shallow layers of clinker to form rapidly. No trouble is experienced when mixing up to 25% of beans with the ¾ to 1¼ in. or 1¼ to 2 in. nuts.

The consumption of dry coke per ton of coal carbonized with varying carbonizing times ranges from 3.02 cwt. per ton at 12.3 hours to 3.28 at 18 hours. The nominal capacity of each producer was given as 38 tons of coke per day and the total coke consumption on peak production is approximately 100 tons per day. Because the standby unit is very often under repair the possible failure of one of the working units could leave two to carry the load for a considerable time. In order to ascertain the degree to which a producer could be overloaded a test was carried out on No. 1 unit. Over a period of four days the blast rate was progressively increased by throttling the supply to the remaining two generators. A consumption of 60 tons was obtained on the fourth day, a truly remarkable figure.

During the test the generator outlet pressure rose from 1.5 in. to 3.8 in. W.G. and the blast main pressure from 6 in.

TABLE I

Manufacturing

Two Years Period Ending March 31, 1954

Total coal gas made .. .. 5,036,094,000 cu. ft.
" " " therms 26,420,640

Cost	Chamber House Labour	Repairs and Maintenance Chamber Houses	Electricity, Water, Steam, etc. Chamber Houses	Tools Chamber Houses	Producer House Labour	Repairs and Maintenance Producer	Electricity, water, Steam, etc. Producer	Total
Actual cost	35,120	3,841	6,571	1,207	8,423	3,941	3,351	62,454
Cost per mill. cu. ft. of coal gas made	139s. 5d.	15s. 3d.	26s. 1d.	4s. 9d.	33s. 4d.	15s. 7d.	13s. 4d.	247s. 9d.
Cost per therm of coal gas made	0.319d.	0.034d.	0.059d.	0.011d.	0.076d.	0.036d.	0.034d.	0.569d.

TABLE II

Fuel Expenditure Index for Year Ending March 31, 1954

Carbonizing plant only (no C.W.G. figures included).
From the formula recommended by the Gas Engineers Advisory Panel.

Coal carbonized	182,494 tons
Coal used	10 "
Coal gas therms made (nett) ..	12,786,102 "
" " per ton	13,890 cu. ft.
Producer gas (diluent)	257,884 therms
Coke saleable	84,402 tons
Breeze "	18,466 "
Tar "	2,187,316 gal.
Benzole "	447,955 "
F.E.I.	17.31
" (allowing for internal B.W.G.)	16.32

Producer Plant

It is obvious to anyone who visits Howdon that the works has been designed not only with an eye to economy in labour but with the purpose of making working conditions as pleasant as possible. The difference in capital cost between the present arrangement and an installation incorporating step grate producers was in the region of £80,000.

The plant consists of four self-vapourizing fully-automatic producers of 10 ft. 6 in. internal diameter, three units operating.

to 3.5 in. W.G. The temperature of the gas at outlet generator increased from 480°C. to 570 to 590°C. It was, of course, necessary to increase the grate speed, but never to maximum and the ash bed depth showed little deviation from normal. Heavy surging took place in the jacket boiler after the third day. The producer proper dealt with the load fairly comfortably. The coke being used at the time was a mixture of Howdon ¾ to 1½ in. nuts and similar-sized coke from another works.

The results were reassuring for they proved that two producers will carry the load in an emergency. Any major overhaul of the standing unit can be carried out at leisure and a working unit may be isolated for running repairs on natural draught for as long as the condition of the fire will allow.

The logical question is: 'Why use three producers if two will do the work?' The arguments against the use of two producers are:—

(1) If one unit failed the remaining one would not carry the load.
(2) Wear would be excessive, making frequent changes of units necessary.
(3) No labour would be saved.
(4) Less complete combustion of coke as evidenced by refuse analysis.
(5) Surging of water in the jacket and waste of treated water by over-evaporation.
(6) The increase in velocity of producer gas by 50% would cause considerably more dust to be carried over.

The last of those reasons is probably the most important since this very consideration was one of the principal points in favour of installing mechanical producers. It is evident that the comfortable load factor on the producers is making an important contribution to the comparatively dust-free conditions of the producer gas-ways and flues of the carbonizing plant and will no doubt play an important part in prolonging its working life.

Under normal working conditions 8½ cwt. of dry dust were collected from the dust arrestor and uptake seals in 48 hours, equivalent to 78 tons per annum. If this be added to the amounts removed from mains and settings the estimated total dust deposited in the system is 90 tons per annum, equivalent to 0.27% of coke fed to producers or approximately 30 grains per 100 cu.ft. of producer gas made, and approximately 87% of that total is trapped and removed from the wet seals. It should be remembered, of course, that some dust will be carried right through the system and out via the chimneys, but if the deposits in waste gas mains and waste heat boilers is any guide the amount is small.

Repair and Maintenance Costs

Neglecting the first six months of working life when the plant was new and few renewals were necessary and considering only the two years period ending March 31, 1954, the total cost of repairs and maintenance of the producer plant was almost £4,000. In this period the four units have had eight overhauls between them, three of which could be described as major. From a survey of the items which have already been renewed and should last another two years, and from an estimate of the expensive parts which are likely to need replacing, it is reasonable to suppose that repairs and maintenance for the whole plant will continue to cost about £2,000 per annum.

Efficiency Figures

Average outlet producer temperature	=	968° F
,, inlet settings temperature ..	=	788° F
Specific heat of producer gas ..	=	.0185
Volume of gas per hour	=	639,450 cu. ft.
C.V. of gas	=	125 B.Th.U. per cu. ft.
Potential Heat	=	639,450 × 125 B.Th.U. per hour
	=	7,993,100 B.Th.U. per hour
Sensible Heat above 60° F	=	639,450 × 728 × .0185 B.Th.U. per hour
	=	8,612,000 B.Th.U. per hour
(*a*) Potential Heat + Sensible Heat ..	=	88,543,000 B.Th.U. per hour
(*b*) Heat input in coke (100 tons per day)	=	11,680 × 2,240 × 4.167 B.Th.U. per hour
	=	109,090,000 B.Th.U. per hour
Hot Gas Efficiency .. $\frac{a}{b}$	=	81.2%

Conclusions

The carbonizing plant has not yet emerged from the first phase in its existence and is still new. I think, nevertheless, that there is sufficient material to prove that the plant is measuring up to the performance for which it was designed. Thermal yield has been given little prominence because it is influenced to a large degree by the coals carbonized and the demand for volume, and many changes in both have occurred.

The thermal yield is satisfactory and consistent, the figure for the year ending March, 1954, being 73.7 therms per ton, excluding diluent, while results for the first half of the current year show a further improvement at 76.5 therms per ton, excluding diluent, or 77.8 therms at 475 B.Th.U. In both cases benzole extraction has been practically continuous and steaming has averaged 3½%.

Much remains to be learned as to how the plant will stand up to the rigours of base load operation and what will be its working life. Plans have yet to be made for resetting programmes which may be regulated by external influences in other parts of the division, as well as by the condition of the settings. Obviously some resetting will need to be done before the condition of brickwork strictly warrants it, in order to inaugurate a programme which will complete one cycle before the last items in it are dilapidated. In the case of the producers I may be more specific. I believe that they have been eminently successful and dare to forecast that they will eventually fully justify the high initial cost.

WARMTH FOR MIDLAND HAIRDRESSERS

The Radiation system of ducted warm air has been installed for the first time in a hairdressing establishment—the Clearwell House Coiffure, Worcester Road, Malvern Link, Worcester. This is an oil-fired unit from which every part of the premises is given thermostatically controlled warmth, and all hot water needs are met, with maximum fuel economy. The self-contained smokeless unit ducts warm air through unobtrusive registers above skirtings. The system is automatic, the only operation required being the setting of the room thermostat. Overnight this is set low, just sufficient heat being given to keep the water hot for a full supply in the morning, when the thermostat is brought to 65°. When that temperature is reached the thermostat shuts off and from then on cuts in and out as required to maintain the desired temperature. The water heatjng is independently and automatically controlled by a thermostat, within the heater.

The Radiation warm air system—fired by oil, gas or solid fuel—was first established for installation in houses and flats, but is now increasingly used for shops, halls, churches, schools and factories, wherever automatic and economical space and water heating is required. Smokelessness is, of course, another primary factor in the system. The Malvern hairdressing premises, incidentally, are in a Victorian building, the interior of which has been entirely remodelled. The builders were F. B. Lucas, Ltd., of Malvern Link, and the heating installations are by Sharpe & Sons, of Malvern.

LECTURES ON 'FLAME'

To mark the Jubilee Year of the Wales and Monmouthshire Section of the Institution of Gas Engineers, a series of four lectures on 'Flame' were given by Mr. Frank Brinsley, M.SC., at the South Wales Institute of Engineers, Park Place, Cardiff, on March 2, 3 and 4. Approximately 800 school children and students attended the lectures and the full support of the education authority was received. The Chairmen for the three successive meetings were Alderman R. G. Robinson, Chairman of the City of Cardiff Education Committee, the Director of Education and Dr. Harvey, Principal of the Cardiff Technical College. In addition to the support received from the education authority, the B.B.C.'s head of Schools Broadcasting in Wales attended a lecture, and a recording of the highlights of the lecture was made by the B.B.C. for transmission as a news extra at 6.40 p.m. on March 8.

A recording was also taken of a conversation between Mr. Brinsley, a B.B.C. reporter, and a senior pupil of the Cardiff High School for Boys, who had witnessed the lecture. This recording was also transmitted in the B.B.C. feature. Parts of the recording were also used in a children's news item broadcast in the B.B.C. North of England studios, and Dr. Rees, who is a member of the B.B.C. Industrial Research staff, also attended one of the lectures with a view to giving an eye-witness account of the lectures in Welsh in a feature programme to be broadcast later on.

Installation of gas-fired space heating equipment at Staplegrove Village Hall, near Taunton, Somerset.

Industrial Gas Development in a Rural Area*

By E. I. Luscombe,

Industrial Gas Engineer, South Western Gas Board.

THE Weston/Taunton Division of the South Western Gas Board is 'truly rural'; and while the scattered nature of farms precludes a gas supply in many cases, we must remember that we are a two-fuel industry, and that for a large number of agricultural requirements coke is an admirable alternative to gas. We have, for example, been successful in installing coke-fired equipment for grain drying.

Regarding sterilizing equipment for the dairy, one manufacturer has developed a coke-fired water heater combined with steaming block which is far in advance of earlier apparatus. Tests have shown that this appliance successfully caters for the average dairy farm—*i.e.*, two steamings a day plus ample hot water supplies for both dairy and farmhouse. Again, coke is supplanting coal for greenhouse heating. In one instance a large nursery has had all coal boilers converted to breeze firing.

In Somerset the shirt and collar industry offers certain scope for gas usage. Air/gas mixing plant is installed in each factory since all callender machines are gas heated and in many cases high pressure gas smoothing irons are still very much in favour. The boiling of starch and steam raising for trubenizing are other gas usages.

The paint-drying of components of electrical equipment is a promising load for gas. For many years such drying had been carried out in one particular establishment in box-type stoving ovens, and it was only after months of representation that infra-red drying was seriously considered. A large infra-red tunnel is now being installed; it is fully instrumented and is equipped with an electronic flame failure device. In factories of the type, other uses for gas are lead and tin smelting, brazing, the heating of muffle and semi-muffle furnaces, and space heating. We have obtained a very satisfactory load from the electrical equipment factories in the area, and there is no doubt that we shall increase this load.

The aircraft industry is well represented in the area; and recent orders placed with the Board include two steam raising boilers, one of 1,670 lb. evaporation and one with an evaporation of 310 lb. per hour. The glassware industry in the area is concerned mainly with the production of apparatus for the National Health Service. In one firm the greater part of the plant employed has been designed by the firm's technical staff and manufactured in the company's own tool room. Travelling annealing and normalizing lehrs, rotary fabricating machines and a multiplicity of burners for natural draught, high pressure gas and air, and oxy-coal gas are manufactured and employed to suit the particular job in hand. The gas and air pressures are raised by Keith Blackman compressors working at 3½ lb. and 5 lb. per sq. in. respectively.

The use of gas in the bacon curing industry is on the increase. With the recent de-control of bacon it was found that production was hampered by the cooling-off of branding irons. Keith Blackman compressors coupled with self-heating irons have overcome this difficulty. In another case a butane gas heated furnace has been converted to town gas firing. A new canteen complete with rest rooms and changing and drying rooms has been equipped with gas-fired central heating, and hot water and kitchen equipment have also been installed. In the Weston/Taunton Division, large scale commercial

* From a paper to the Western Junior Gas Association, January 13, 1955.

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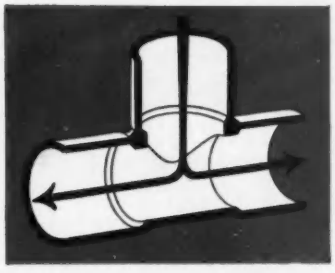

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gas sales have been the responsibility of the Industrial Department. In this field there is ample scope for the development of gas sales.

We have an extensive coast line and therefore a number of holiday resorts. Consequently, catering, hot water supply, and central heating offer excellent opportunities. Efforts are made to balance the catering and central heating load. All gas sales representatives would be well advised to contact consumers whose premises are equipped with central heating installations having solid fuel boilers. Gas eliminates storage difficulties and does away with the labour problem. In this area nine central heating boilers have been installed for the current heating season; and in the gaining of the load the co-operation of the heating engineer has proved most valuable.

Installation of gas unit heaters has led to an appreciable load from factories, churches, parish halls, recreational rooms, dining halls, and numerous other premises. From the many types of radiant heaters on the market today we cannot fail to offer an efficient heating installation which is both low in capital cost and competitive in running costs. The application of radiant heaters for the outside warming of shopping premises is promising.

Recently the author negotiated the installation of gas-fired meat boilers at the Glen Kennels, Norton Fitzwarren, and suggested to the proprietress the use of gas for kennel heating.

The kennels consisted of four blocks each containing 10 kennels approximately 6 ft. × 8 ft. high. Half brick and wire mesh formed the front, and the partitions were of similar construction. An estimate was submitted for the supply and installation of a small bowl heater mounted 6 ft. from the floor in each kennel, and as a result 30 heaters were installed. This is an unusual load. The point I would emphasize, however, is that we must investigate every possible avenue in our efforts to sell gas.

A two-part tariff assists considerably when negotiating a baking load. Oil, of course, is our only competitor offering heat at approximately 1d. or even 2d. per therm less than we ourselves can in this area. Even so there are many factors in our favour. A small baker in Taunton having two retail shops, recently formed a limited company and bought out another baker, which provided him with three additional retail shops together with premises suitable for a central bakery. During an interview with him we inspected the proposed bakery together with an oven manufacturer's representative. The baker had not decided whether to use oil or gas. Gas had one immediate advantage, however, since oil-fired ovens, of which three were required, would have cost £430 more than the equivalent gas-fired ovens. In addition to this it would have been necessary to construct a glazed lined chimney if oil firing were chosen and to have allocated valuable space to storage. The West Somerset Co-operative Society has purchased a site in Taunton and intends to build a new bakery. These premises will be completed and in operation during April.

Fig. 1. Collar manufacture at the Ilminster factory of Day & Foley, Ltd.

Fig. 2. Catering equipment at Tone Vale Hospital; this equipment is used in catering for up to 1,400 people.

Fig. 3. Gas-fired infra-red drying tunnel at the works of Avimo, Ltd., Taunton.

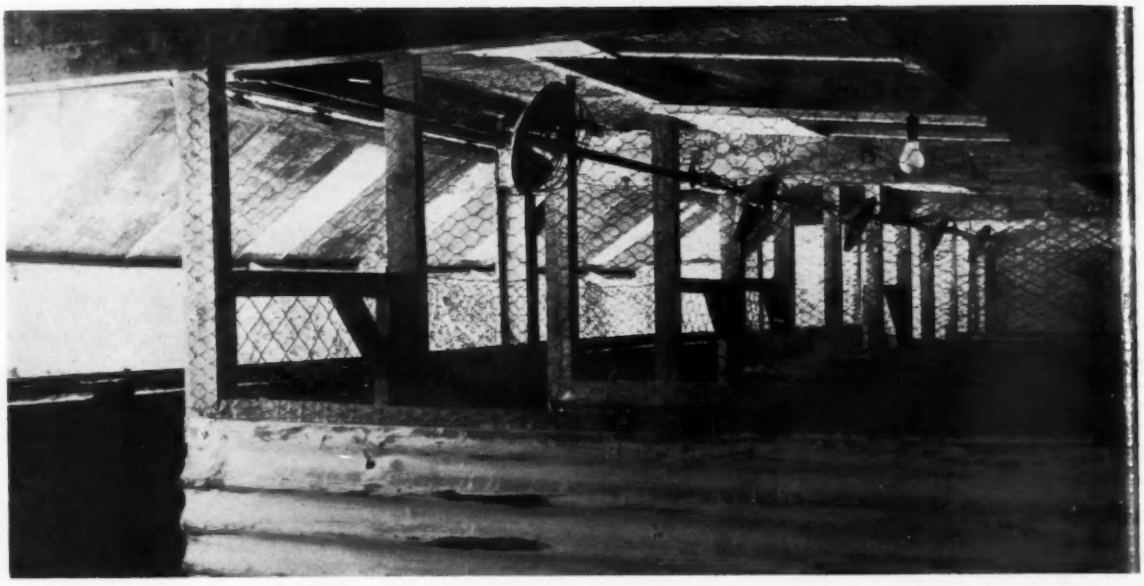

Fig. 4. Gas-fired bowl heaters at the Glen Kennels, Norton Fitzwarren. 30 heaters of the type shown in this illustration were installed.

1956. The author has been successful in obtaining the baking load for gas with an estimated consumption of 15 mill. cu.ft. per year.

Downside Abbey and School is of particular interest to us since for many years it has been supplied with gas from its own works. To obtain this load it was, of course, necessary to show that a saving would be effected. Apart from their consumption of coal there was no indication of how much gas was made or consumed, since the supply had never been metered. We installed a meter and found that approximately 7 mill. cu.ft. per annum could safely be reckoned on. The coke yield from the retort house was weighed over several weeks. The result of the investigation was that we were able to show a saving of approximately £250 a year.

Fig. 5. A coke-fired Bettison grain drier at Elworthy Farm, Greenham.

It was agreed that a supply would be taken direct from the Board's main and that the works and holders would be dispensed with. Having successfully obtained this load, an approach has been made with a view to increasing the existing load by using gas for a number of other purposes.

The Divisional Distribution Engineer, while negotiating wayleaves through the grounds of Montacute House, now the property of the National Trust, approached the Trust's area agent with a view to extending the supply to the house itself. After full consideration, the heating scheme which we submitted was accepted, and a gas-fired boiler of 504,000 B.Th.U. rating is now being installed.

MORE COMFORT FROM NEW FIRE

Tests have been made at Leatherhead by a research team from the domestic appliances laboratories of the British Coal Utilisation Research Association to gauge the effect of a new type of appliance on domestic fuel consumption and comfort. The tests took the form of a comparison between the ordinary open fire and a new free-standing open fire incorporating a reduced flue opening and chimney damper, with provision for control of burning rate and for safe overnight banking. The appliance can be installed in existing fireplaces and retains the main characteristics of the traditional open fire, but by reducing room draughts to a minimum and giving an additional output of heat as air which has been warmed by contact with the back and sides of the firebox, it gives a higher efficiency in the same way as the openable stove does.

Some 40 households were divided into three groups. Two used the ordinary open fire for the first half of the test period, and were equipped with either one or other of the two types of free-standing fires under test during the second period. The third group continued using their ordinary open fires throughout the test, and provided information which enabled variations in the weather to be allowed for. All fuel was weighed by the housewife, but she operated the fire as she wished, using the ordinary coal supplied by her merchant. Temperatures in the rooms concerned were automatically recorded. A report on the experiments published in the *Journal of the Institute of Fuel*, says the results were striking. There was a fuel saving of 21% with the free-standing fires despite the fact that they were used for longer periods and overnight burning was more extensively practised with them. It was clear both from the scientific measurements and from the comments of the users that the rooms in which the new fires were installed were warmer and more comfortable. Draughts which had been very noticeable with the open fires were almost completely eliminated with the free-standing fires. On a basis of room warming per pound of fuel burnt, the free-standing fires were shown to be 60% to 70% better than the normal open fire.

Theory and Design of Aerated Burners

By J. A. Prigg.—Concluded from March 9, p. 654

It is not possible to lay down an optimum design of burner for all conditions or applications, since much of the performance of a burner depends upon its immediate surroundings in the appliance, and upon the nature of the heating required. There are, however, certain major requirements which must be met by the burner-appliance combination. These are:—

(1) Combustion must be complete; neither carbon monoxide nor carbon must escape from the flame.
(2) The heat from the flames must be applied as efficiently as possible.
(3) The flames must be stable, i.e., they must not light back in the case of town gas, or lift in the case of hydrocarbon gases, over the whole range of normal use of the burner.
(4) The flames must travel readily from port to port on lighting the burner.
(5) In some cases, noise from the burner, either in operation or on extinction, is undesirable.

Combustion and Efficiency

To some extent the requirements for good combustion and the efficient application of heat are inter-related; these two factors are therefore discussed together.

Generally about half the air required for combustion is supplied as primary air. The remainder must be obtained as secondary air. The flow of secondary air round the flames depends upon the provision of inlets below the burner and outlets for the products of combustion above the burner. The access of secondary air to the flames is aided if the flames are spaced to allow uninterrupted flow of air to each. For example, a single row of flame ports on a burner can obtain secondary air more readily than a double row. On the other hand grouping of the flame ports so that the outer mantles of the flames merge into one has been found to increase the efficiency appreciably, probably because excess air is in this way reduced to a minimum.

A reduction in the amount of primary air increases the demand for secondary air, and poor combustion may result if there is insufficient secondary air under all conditions. A margin of safety must be provided for inexact workmanship in the production of the appliance and for some change in its use. This margin is generally covered by the overload test for combustion specified in British Standard 717. Nevertheless, poor workmanship in the manufacture of the burner may leave little margin for inaccuracies in the appliance or for changes in use. Poor primary aeration may arise from bad centering of the injector orifice relative to the burner or from accidental restrictions in the burner, such as core wires remaining intact in a cast iron burner.

In use, reduction of primary air may result from blocking of the flame ports or air ports. The former can be minimized by ensuring that material falling on to the burner is deflected. With industrial burners, for example, a length of angle iron arranged above the flame ports in the form of a roof is frequently used to prevent corrosion products falling into them. On cooker hotplate burners flame ports in a vertical plane have been found least likely to be blocked with spilt food.

The air port is more difficult to protect, since material is drawn into it from the atmosphere. Examples are the blocking of cooker burners by grease in a grease-laden atmosphere and of gas fire burners by dust and fluff from the room. If the air port is made as large as possible, the effect on primary aeration will be delayed. Cleaning of the burner at suitable and regular intervals, however, is probably the correct solution.

Another cause of inferior combustion is associated with the chilling of the inter-conal gases by the object being heated. These gases contain carbon monoxide and if they are cooled below the burning temperature before they can mix with sufficient secondary air, carbon monoxide will escape. The correct position of the object being heated, and of its support, is therefore important, but this position will depend upon the size and angle of the flames and the extent of the surface being heated. This position, too, has an important effect on the efficiency as shown by E. W. B. Dunning for cooker hotplate burners. He found that the efficiency generally increased as the vessel being heated was brought closer to the burner but eventually the combustion deteriorated and the efficiency then fell off again.

Variation in the gas supplied to the burner will have an effect on combustion. An increase in Wobbe number of the gas will require an increase in secondary air, while an increase in the aeration number leads to larger flames with the possibility of more chilling of the inter-conal gases. For conventional town gas high Wobbe numbers are generally associated with high aeration numbers, and worsening of combustion from both these factors is to be expected with 'soft' gases. Because of the inter-relation of combustion and efficiency some compromises in the design of burner in the appliance may be necessary.

Stability of Flames

The general problem of stability of flames has been discussed already. There are, however, some problems of stability which arise in particular applications and these are now mentioned briefly.

An aerated burner in a cooker oven is required to work satisfactorily at full-on rate, i.e., about 20 cu.ft. per hr., and at by-pass rate, about 3 cu.ft. per hr. At by-pass rate it is sometimes found that the flames light back to the injector orifice on slamming the oven door. The trouble is, of course, due to the sudden increase of pressure in the oven when the door is shut. It can be counteracted, to some extent, by ensuring that both the flame port and air ports of the burner are exposed to the same pressure shock, that is, they are arranged on the same level and face in the same direction. This may lead to difficulties at high rates, for, when the flames are bent over by the pressure, they may ignite the gas at the air port. A barrier between the flames and the air port may be sufficient to eliminate this. A more positive cure for the trouble is to provide sufficient openings in the base of the oven in order to avoid the increase in pressure as far as possible.

Leakage

Leakage of gas from the air port of a burner at low gas rates may occur if the air port faces upwards. This appears to be due to the buoyancy of the gas and is aggravated by a small throat or a restrictor in the throat. Generally, the leak can be cured by ensuring that the air port is covered at the top of the burner.

On a cooker hotplate, the tap immediately before the injector orifice causes the gas passing through it to make a sudden change in direction through 90°. The flow is disturbed and may affect the flow through the orifice, particularly on partial turndown, resulting in poor aeration of the burner. A small disc of metal immediately behind the orifice, or other device, will help smooth out the irregularities in the flow and give better aeration.

Lighting Across

Ready cross lighting of a flame from port to port is necessary to ensure that unburnt gas does not escape and to prevent delayed and possibly violent ignition. Some experiments at Watson House suggest that the mechanism of cross lighting is as follows:—

When one flame on a burner has been ignited, the next one to it will only ignite if the air-gas mixture from the second port can reach the flame before it becomes too diluted with the surrounding air. The air-gas mixture from the unignited port mixes with the air at constant momentum and spreads

out in the process. On this basis, it can be shown that the cross lighting distance is approximately proportional to the diameter of the flame port. This approximate result has been confirmed by experiment, and the following table gives the maximum spacing at full-on rates and at very low rates for burner ports of various sizes, for conventional town gas of 500 B.Th.U. per cu.ft.

Port Size Dia. in.	Maximum Distance between Centres in.	
	At full rate	At low rate
1/16	0.35	0.25
3/32	0.45	0.30
1/8	0.65	0.40
5/32	0.90	0.50
3/16	1.10	0.60
7/32	1.25	0.70

The results were obtained in free air; this is probably the worst condition, since in the more confined space of an appliance, cross lighting will generally be easier. The results, too, are for flame ports in one plane. Ports on cooker hotplate burners are frequently drilled at an angle, and if the ports point away from one another, closer spacing than that given will be necessary.

Gaps in the flame port drillings are frequently left on cooker hotplate burners in order that the flames will avoid the pan supports. These gaps should not, of course, be excessive for sucessful cross lighting. Sometimes a drilling smaller than the others at this point will enable successful cross lighting to be effected. Similarly, the cross lighting of a grill burner from one side to the other can be achieved by means of small pilot flames suitably placed.

Noise

An aerated burner may produce noise in any of the following ways:—

(1) A hiss or whistle as the gas passes through the injector orifice.
(2) A noise associated with the flames, usually referred to as a burning noise.
(3) A minor explosion on turning off the burner suddenly, usually called noise of extinction.

Sometimes the surroundings of the burner will accentuate these noises.

A gentle hiss as the gas passes through the orifice seldom causes annoyance. Sometimes however burrs left on drilling the orifice give rise to an irritating high-pitched whistle. Generally removal of the burrs effects a cure.

Safety Factor

Burning noise, if not excessive, may not be undesirable, since it gives audible evidence that the burner is alight. The noise is caused by the rapid fluctuation of the position of the flame front, and is associated with high burning velocity of the mixture and turbulence or poor mixing in the burner or flame ports. Natural gas or butane, because of their low burning velocities, do not give rise to burning noise, nor do mixtures of town gas and air of low burning velocity, that is, having a high proportion of gas. The cure of excessive burning noise then, lies in ensuring satisfactory mixing of the air-gas mixture, in eliminating roughness in the flame ports or burner, and, if necessary, in reducing the air-gas ratio.

The most serious noise associated with aerated burners is the noise of extinction. On turning out the burner, the burner tube and head are left filled with a mixture of gas and air, which continues to flow at a reducing velocity, but still drawing in air. The mixture becomes an explosive one, and if, at this stage, minute flames are still alight on the flame ports, the mixture in the burner will explode. Several seconds may elapse between extinguishing the burner and the noise of extinction.

The mechanism outlined suggests methods of overcoming the difficulty. If the flame ports are made small, the flames left on turning out the burner are rapidly extinguished and the explosion cannot occur.

Again, if the burner is of low resistance, the air-gas mixture will be rapidly diluted and the explosion minimized. On these lines, the American Gas Association have devised an empirical formula relating the diameter of the burner tube, the total port area, the length of the burner tube, the area of the individual ports and the temperature of the burner to the noise of extinction. Reference to the original work will indicate the relative importance of these factors.

Burners with Special Features

Self-extinguishing Injectors

One of the disadvantages of the aerated burner is the tendency to light back to the injector. It is possible, however, to design the burner so that the flame is unstable at the injector, even if a light is applied there. Burners so made are said to have 'self-extinguishing injectors.'

A number of designs may achieve this feature. Minchin gives designs and discusses the theory. Briefly, the design of the throat must be such that the air and gas in it are well mixed and move with a high velocity. The external shape of the injector nipple must allow the air to flow into the throat without eddying.

Perignitible Burners

When a flame is introduced at the air port of some self-extinguishing injectors, the flame is blown forward without extinction and lights the burner at the flame ports. A burner of this kind is said to be 'perignitible' and the property is sometimes, though rarely, used to light a burner, the flame ports of which are relatively inaccessible. The exact conditions for the flame to travel forward through the burner are not clearly understood. Flame travel is aided by a short burner tube and by an aeration that is not too high. The air-gas ratio, however, must be at least 2:1, for this is approximately the limit of inflammability for 500 B.Th.U. per cu.ft. of gas. Having travelled through the burner, the flame must be able to pass through the flame ports, and this depends upon the spacing as well as the size of the holes. For ¼ in. spacing, holes of 0.1 in. diameter are sufficient, but at ½ in. spacing the holes must be 0.3 in. diameter. Lastly, if the aeration is too high, the flame, although it appears at the flame ports, is extinguished by the subsequent passage of the products of combustion from the burner tube. A suitably placed pilot ignited by the first flame might be sufficient to overcome this.

Totally Aerated Burners

The ordinary aerated burner entrains between 50 and 60% of the total air required for combustion. It will be seen from earlier remarks that it is quite possible to entrain all the air required for combustion as primary air. A larger area of flame ports and a smooth throat and burner are necessary. With this kind of burner no secondary air would be required, the temperature of the flame would be higher, and the volume of the flue gases smaller. A more intense flame with a higher possible efficiency in use would therefore result.

The problem, however, is to burn the mixture containing all the air for combustion as a stable flame. The burning velocity is high and light back will occur with all but the smallest flame ports. Attempts to overcome the difficulty have been described by Minchin and the American Gas Association. Minchin used a metal plate perforated with tiny holes for the burner head, on the same principle as the Davey safety lamp. He was able to burn the mixture satisfactorily at full on rates, but on turndown, the flames came closer to the metal plate, heated it to redness, and light back occurred. The American Gas Association used a variety of flame ports, including wire gauzes and narrow slots. They, too, found the same difficulty on turndown.

A Successful Burner

A successful totally aerated burner has been marketed in recent years. The burner head consists of a ceramic tile about half an inch thick, perforated with holes of about 0.04 in. diameter. Light back does not occur with this type of burner head for the underside of the tile remains relatively cool, even at very low gas rates, because of its low thermal conductivity. The flames are produced in close contact with the tile which becomes red hot on its upper surface, and the burner is finding commercial use in the field of radiant heating.

With this type of burner head, the heat release per unit area is comparatively low (about 300 B.Th.U. per hour per sq. in.) and there remains the problem of the design of a compact, totally aerated burner for direct heating applications.

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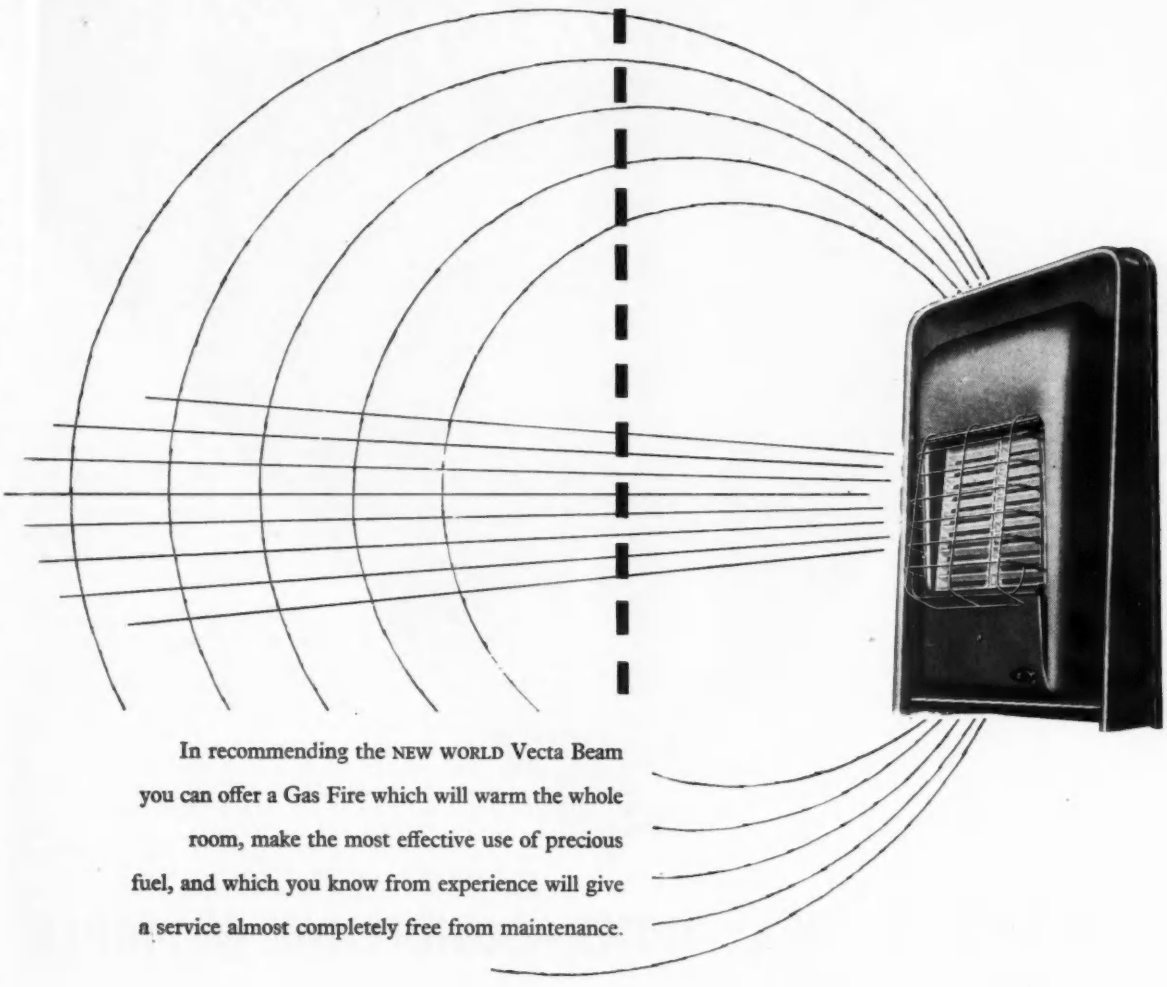

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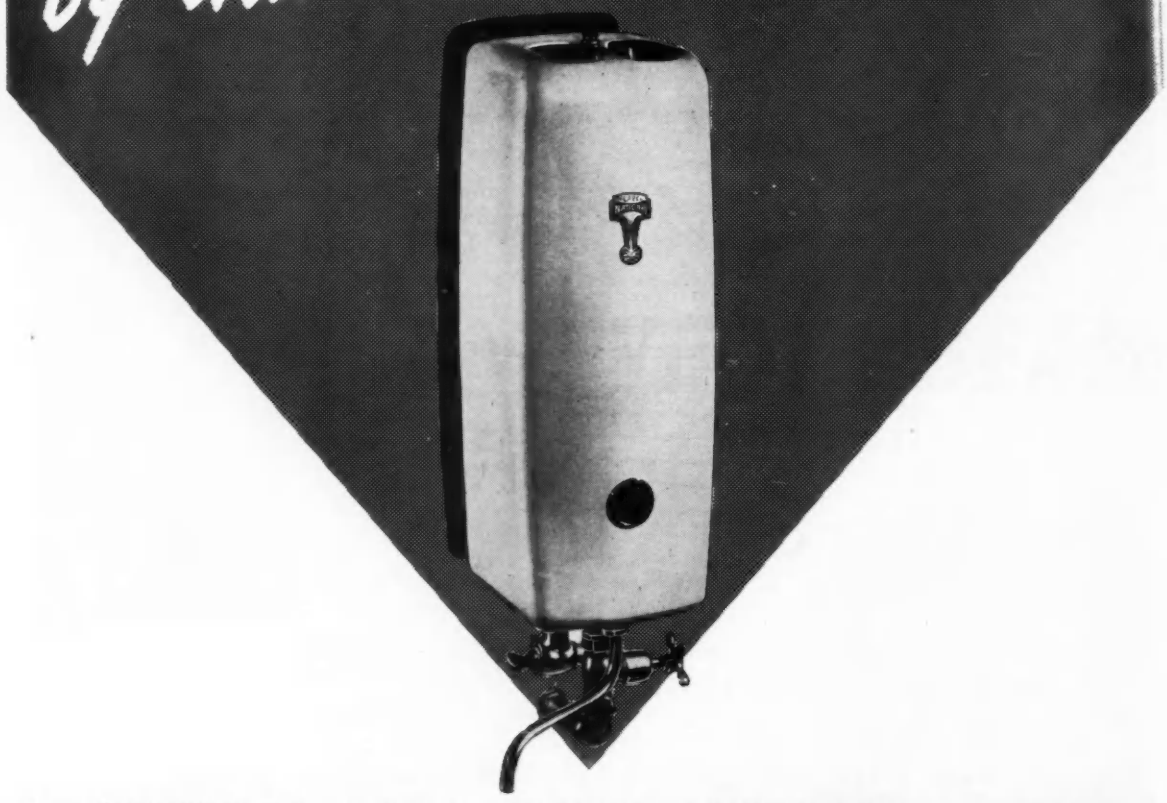

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By-product Developments at Tottenham

Following is an abstract of the discussion on the paper presented to the London and Southern Section, Institution of Gas Engineers, by H. Wadsworth, Eastern Gas Board, Tottenham Division, on February 15, 1955. An abstract of the paper was published in the 'JOURNAL' of March 9, pp. 645-649.

Mr. G. Dougill, North Thames Gas Board, said he was tempted to ask, in the manner of the learned judge, 'What is a by-product?' He was afraid he would have to answer that question: 'A by-product is an unpleasant impurity extracted from the gas which is passed on to our neighbours at the products works, out of which the man-in-the-street believes they extract all sorts of valuable products.' But that was so far from the truth that he thought it would be wise to start by thinking why they extracted by-products. First, H_2S. They took that out because of legislation, though even without it, it was such an undesirable constituent that it would have to be extracted. Ammonia used to be the main indigenous source of fertilizers, but now it was removed because of its undesirable properties. Tar came out on its own immediately cooling of the crude gas began, whereas benzole was the only product the extraction of which could be controlled at will. By that he meant it needed only to be extracted when it was financially worth doing so.

A Vexed Question

Then there was the vexed question of whether by-products should be made to a specification, as desired by those working them up, or whether by-products should merely consist of impurities taken from the gas in whatever form or quality they appeared. Mr. Dougill thought the overall decision between those two opposing lines of thought was that by-products should be disposed of either profitably or at the least cost, and this involved a certain amount of treatment at both works.

For example, he thought the capital cost of installing extra purification plant in order to work up spent oxide to 60% of sulphur would be much greater than the installation of slightly larger oxide burners required to burn spent oxide containing only 50% of sulphur. At present at Beckton they had a considerably increased interest in by-products and could certainly claim to have made one advance in the quality of one of the products, namely coke oven tar. Gas engineers might not be aware that coke oven tar contained a small proportion of finely divided solids which settled out during storage. They blanketed the steam coils, involved expensive cleaning of tanks, and interfered with the smooth separation of water. By the use of a Russell filter they were now able to filter coke oven tar at an approximate rate of 1,000 gal. per hour through 120 mesh screen about 4 ft. by 1 ft. 6 in. This greatly improved the cleanliness of the tar storage tanks, allowed the steam coils to continue heating the tar, and thus allowed normal separation of water. The process had not been found necessary on horizontal or vertical retort tar.

They were also installing plant to recover sulphuretted hydrogen directly by a liquid process. This involved production of gaseous sulphuretted hydrogen which they were going to burn to sulphur dioxide and make into sulphuric acid by the contact process. They regarded this as a pioneer process. The figures of gas given in the paper, said Mr. Dougill, would be of considerable interest to them for comparison with the costs of sulphuric acid made on the plant.

Finally, he had been intrigued by the eccentric roller on the belt conveyor underneath the sulphate hopper. He wondered whether this would have any applications on belt conveyors conveying wet coal, which was now being received in such large quantities.

Mr. J. C. Hogg, Southern Gas Board, said that in connection with the sulphur plant, the recycling of waste gases mentioned in the paper appeared to be a very efficient way of saving steam. He had noticed they were using high pressure steam on the still. He thought that high pressure steam was something of an anathema. At Bournemouth, they had for some years been using an experimental recycling drive. They had found, as the author had done, that this recycling, although it was not quite by the same method, did return a lot of valuable heat to the still. In one of the slides that had been shown, Mr. Hogg had noticed that the vertical conveyor for the salt appeared to be a rubber pipe. Had Mr. Wadsworth, as they had done, found a certain abrasion taking place, or had he got some polythene he was using for that purpose? It was certainly a much better material to use than steel, for example.

Mr. R. M. Roberts, British Sulphate of Ammonia Federation, said that he doubted if he could have written the sulphate of ammonia chapter better himself. But there was just one point; he had been asked whether he thought it feasible to make the intermittent process thermally self-supporting. From the figures quoted by the author, one would almost think that with an efficient form of mechanical decompression it would be possible to make the process thermally independent, but in practice, he thought this was impossible, for, first of all, it was very difficult to utilize all the sensible heat in a still freshened by a thermal interchange That was one source of loss of heat. In the process of fuel filling there was also a big loss of heat. Even with the most proven forms of decompression, he did not think it would be possible to make the process entirely self-supporting, on the thermal basis. Although the recycling on the author's plant was certainly very satisfactory, from a practical viewpoint there was very little heat left from the saturator.

Mr. Roberts commented that the recycling system at Tottenham was really very efficient, considering the available steam pressure. This was seldom more than 85 lb. per sq. in.

Mr. R. Summerson, Eastern Gas Board, said he noticed that the cost of steam was a matter which worried the author. As a matter of interest, at Luton works all the processes and heating requirements on the works were now performed by exhaust steam, including production of sulphate of ammonia. So that, in his case, was a very small cost. Mr. Wadsworth had been rash enough to give production costs for sulphate of ammonia and sulphuric acid but, Mr. Summerson said, he noticed that he had not mentioned any selling costs.

Mr. M. Cuckney, North Thames Gas Board, felt the author was particularly fortunate in that he did not have to worry about the fixed ammonia. At Beckton, he regretted to say, it was assuming increasing importance, and that was because such quantities had to be delivered at one spot to a sewage system. For example, if no fixed ammonia was being recovered, that would make the effluent disposal a very serious matter as understood by the sewage authorities. They were concerned, not only with the free ammonia which it was possible to get out in the recycling very efficiently, but they also required that the total ammonia should be reduced to as low a figure as possible, otherwise a charge for effluent disposal might be a serious matter for a by-products concern.

Mr. R. F. Robinson, Eastern Gas Board, asked the author if he could give some indication of the labour savings per ton of sulphate which applied to the old plant and to the new. Mr. Robinson imagined these must be something spectacular.

Mr. Wadsworth, replying, said Mr. Dougill was complaining about by-products not being a paying proposition. He did not understand that at all; he had found that it was. In answer to Mr. Hogg's question about the vertical conveyor which appeared to be a rubber pipe, Mr. Wadsworth confirmed it was made of this material. Previously, they had found the bottom section where it bent over had worn due to abrasion. Now its life was a lot longer. On Mr. Roberts' remarks about whether they could make the plant self-supporting, Mr. Wadsworth said he thought that if they worked it out ignoring radiation losses, they could do it—theoretically. In practice one never got that far because the main heat source was in the saturator due to sulphuric acid meeting ammonia.

(*Concluded on p. 731*)

REMOVAL AND RECOVERY OF SULPHUR FROM FUELS

Two papers on the removal and recovery of sulphur from fuels, presented at the Institute of Fuel Conference in London last October, were submitted to, and discussed by, members of the Manchester and District Section of the Institution of Gas Engineers and the North Western Section of the Institute of Fuel at a recent joint meeting in Manchester.

AT the joint meeting the Chairmen of the gas and fuel organizations, **Mr. H. Johnston** (North Eastern Gas Board) and **Mr. A. Harrison Slade,** said the exchange of views on the important subject that had brought them together had been valuable, and the hope was expressed that there might be other opportunities for joint meetings. **Mr. A. Harrison Slade** presided.

The paper entitled 'Sulphur Removal from Fuel Gases by Dry Methods' (by R. R. Griffith, B.A., D.PHIL., Director, London Research Station, Gas Council), was presented on behalf of the author by Mr. L. G. Townsend, M.SC., of North Western Gas Board, Liverpool Group. 'Sulphur in Coal Gas and its Removal by Wet Methods' (by S. R. Craxford, B.A., D.PHIL., Head of the Intelligence Section, Fuel Research Station, D.S.I.R., and A. Parker, C.B.E., D.SC., Director of Fuel Research, D.S.I.R.) was presented by Dr. Craxford.

In the first of the papers, dry purification by iron oxide was described with reference to the chemistry of the process, the sources of iron oxide, the design of purifiers, methods of operation, process control, uses of spent oxide and the cost of purification. Reference was also made to special forms of iron oxide and to recently developed designs of purifiers with an indication of possible future developments. Dr. Craxford in his paper gave an account of the various wet methods at present in operation on the full scale for the recovery of sulphur from coal gas. The chemistry of the processes and the plant involved were described. A list of the materials and utilities required were given so that approximated working costs could be estimated for any particular project. The extent to which each process was being used was dealt with together with an indication of the relation of total cost of gas purification to the cost of purification with iron oxide in the usual way.

In introducing the discussion, the Chairman described the wet methods of purification as 'very challenging'; nevertheless the gas industry seemed strongly attached to the box method.

Puzzled

Mr. H. G. Cooper (Simon-Carves, Ltd.) remarked that Dr. Craxford had stated that the cost of running a liquid purification plant was in the order of 25% more than that for oxide boxes. He was puzzled why, instead of using the bought alkali and soda ash, ammonia, which was already available on the works, had not been used. It was appreciated that the process fixed some of the alkali in the formation of the thiocyanate, thiosulphate, etc., but these could be reduced to a minimum by efficient design and method of operation. Surely, it was economically preferable to distil free ammonia back into the system rather than to buy soda ash. By these means he felt the operating costs could be reduced to the equal of dry boxes. There was a further aspect to the use of gasworks ammoniacal liquor, particularly if the source of this liquor was from vertical retorts, where there was a high concentration in the liquor of polyhydric phenols and these compounds, as would be appreciated, formed complexes with ferric hydrate. Further, it had been found that the rate of oxidation was considerably accelerated when such compounds were present. This was in agreement with the literature available regarding the Reeson Moss process employing organic hydroxy-compounds. Employing such liquors containing polyhydric phenol-iron complexes the quantity of dispersed air could be reduced and it was possible to reduce the concentration of suspended iron sulphide being recycled. These were obviously the most essential points in reducing the operating costs of such a process.

In the survey by the authors of the various methods of liquid purification there would appear at first glance, a strong case for the equilibrium processes since these appeared to be rather lower in general operational costs, but with such liquid processes as these, only partial H_2S removal could be obtained. In the gas industry, where such stringent legislation is made relative to the concentration of sulphuretted hydrogen in town gas, the size of the purifier boxes, if dry boxes were to be used to follow such an equilibrium process, must be in the order of 50% of the normal capacity of dry boxes where such a liquid process was not employed. The cost of the smaller dry boxes would probably be in the order of 60 to 75% of the cost of the complete dry box installation.

In the gas industry then, it would appear that to employ a process of this type, followed by dry boxes, and in which the capital cost was, say, 150% of dry boxes, could only be advantageous if a product of good quality sulphur or sulphuric acid could be produced reasonably within the limits of the costs of dry box purification. Also there should be allowance made in such processes for the added care and attention necessary compared with the much simpler operation of dry box purification only. Mr. Cooper said he understood that a process was being installed at the Avenue coking plant of the East Midlands Division of the National Coal Board, employing the specially designed Flixborough burner in which the spent oxide was burnt at a low enough temperature to maintain the oxide in a suitable working condition for further use in dry boxes. This process would appear to have very many advantages as there would be little or no effluent, and the resultant product was sulphuric acid.

Mr. D. Lewis expressed the view that the R factor was going to be influenced by the capacity and future design of plant employing dry methods, and in such a development, of course, the main item would be capital costs. If the R factor was going to be in the region of 80%, capital costs would have to be considerably reduced. He had dealt with a purification plant with an R factor of 60% with very satisfactory results. As regards sulphur in coal, the gas industry would be very pleased indeed if the National Coal Board would supply coal free of sulphur. That would eliminate much heavy expenditure, relieve engineers of many headaches and contribute to cheaper gas.

Mr. Townsend replied that he did not think the sulphur content in coal, within reasonable limits, had a great effect on the cost of purification, though certainly high sulphur coals were most undesirable for gas production. It was an incubus on the gas industry that it had to remove sulphur to a ridiculously low concentration. He considered it would be more logical to permit total sulphur to a stated quantity. While the gas industry had to purify to an extraordinarily low limit, Mr. Townsend did not think any process would ever be as reliable as the oxide boxes. The R factor must be related to the number of boxes in the series. The cost of tower purifiers must be related to the size of the installations. An investigation was being made of the lower limits.

Dr. L. Cohen took up the point that the gas industry would be pleased to get coal free from sulphur. The National Coal Board, too, would be pleased if it could locate deposits of such coal. Users of gas appliances would be no less pleased to get sulphur-free gas. Having worked on the design of gas appliances, he could say that the biggest headache underlying the whole of design problems was how to prevent corrosion, and it was a problem which had not yet been solved. Another unrelated problem concerned the use of fluidized iron oxide to remove sulphur. The gas industry in many respects would do well to apply some of the methods of the chemical industry as opportunity arose, and to use the fluidized technique in order to get the maximum R factor. From the chemical engineering

oint of view, fluidization was a desirable objective, and it ielded sulphur with a high degree of purity.

Mr. Townsend replied that it was possible to purify gas own to limits which would not cause corrosion difficulties, ut of course, cost and whether the country could afford would enter into the question. A point that emerged when uidization was investigated about five years ago was that normous quantities of material would have to be handled; iat he felt was a factor which was holding back develop- ients.

Mr. J. Kershaw said he agreed that when oxide was first ut into the boxes one could expect it to be 90 to 95% effec- ive, but he was surprised to hear it suggested the boxes should e changed when the figure fell to 80%. If he worked to hat basis, his costs of purification would be considerably ncreased. In discussing costs of purification it would be nore sensible to express costs in terms of the quantity of sulphur recovered rather than in terms of quantity of gas purified.

Mr. H. Johnston, O.B.E. (Chairman, Manchester Section I.G.E.), said the two main aspects of the sulphur in fuel problem before the October conference were: (1) The elimina- tion or reduction of oxide of sulphur in the atmosphere and the control of sulphur level in manufacturing processes, and (2) the efficient recovery of as much as possible of the sulphur liberated in the combustion or gasification of fuels, in order that the national demand for sulphur should be met to the greatest possible extent by sulphur from an indigenous source. The gas industry recognized these laudable objectives; in fact, the gas industry as a whole recovered about 40% of the sulphur in the coal that it used—a figure which was in excess of any other fuel industry. Indeed, the thoughts if not as yet the full actions of the industry, were directed beyond the removal of hydrogen sulphide from the gas being made, also towards a reduction of the smaller amounts of organic sulphur.

'But, let me say,' went on Mr. Johnston, 'lest the coal industry seize upon the fact that they are supplying us with sulphur at coal prices when the market price of sulphur is £15 per ton and conceive the idea of raising coal prices, that sulphur in coal has no economic attractions for us, indeed it presents the Devil's own problems. Town gas in Great Britain has, by legislation, to be free of H_2S, or as free as the prescribed statutory test allows, which is no more than 0.09 grains per 100 cu.ft. As we have been told, crude coal gas contains 500/1,000 grains per 100 cu.ft., so that at all times removal must be fully effective. Government inspectors pay us frequent visits and take their own tests to see that we are carrying out fully our statutory obligations. If we fail without good reason we are punished according to the law.

'Perhaps our biggest problem, within the scope of the two papers we have heard, lies in effecting the removal and recovery of sulphur in the most economic way, by reducing the cost of the process and by reducing labour requirements and eliminating the obnoxious nature of the duties of man- handling the purifying medium by improved design and mechanization.' Mr. Johnston expressed the thanks of the Manchester Section I.G.E. to the North Western Section of the Institute of Fuel for arranging what had proved to be an extremely interesting and valuable meeting.

FUNCTIONS OF A COAL TEST WORKS

A brief report of the discussion on the paper by G. E. Brooke, delivered to the Midland Junior Gas Association on February 8, published in the 'JOURNAL' *on February 16.*

The **President** (Mr. H. J. Reynolds) recalled that the Author's father, Mr. Tom Brooke, was the first superintendent of the coal test works. Most of them knew the difficulties of sampling and testing coal and after hearing the paper he felt that in that area they were ideally placed, with such plant and such excellent conditions, for sampling and testing coal. He congratulated Mr. Brooke on the paper and especially on the friendly way in which it had been delivered.

Mr. E. T. Pickering (Area Chief Chemist), who proposed a vote of thanks to Mr. Brooke, said: The two-fold purpose of coal testing was to check the quality of coals bought, and to provide information to engineers and others to help them assess their production results. Before the war the test plant provided the management of the Birmingham undertaking with information which greatly assisted in the choice and pur- chase of coals in the light of quality and price. Mr. Pickering recalled that buying was very keen; he could remember occa- sions when, if visitors were expected in the laboratory, sample bottles with labels which might have disclosed the source of a coal had to be discreetly put out of sight. They now had little choice in the kinds of coal purchased, and the price was fixed by a formula devised by the National Coal Board. Nevertheless, there were occasions when matters of quality and price were taken up with the Coal Board. Mr. Pickering emphasized the necessity to have a sound case in taking up such matters with the National Coal Board, and in particular said that sampling and testing must stand up to close scrutiny by the Coal Board's scientific staffs.

Nationalisation had brought its problems to the central test works, for whereas before the war only Birmingham coals were examined now the coals from the whole of the Board's area received attention. Before the war Birmingham received only 30 different coals. Now over 100 were received, while over 200 different kinds were received in the area. The rate of sampling at the test works had been trebled, and by means of a wholly mechanized plant now in course of construction it was expected to increase the numbers of samples taken and to reduce the amount of labour required.

While nationalisation had brought its problems it also brought greater possibilities, for now there were opportunities to allocate coals to various works with greater regard to their individual properties. For example, if the Beaver Report was to be implemented, then the knowledge gained at the central test works of the quality of coke produced from the many coals examined should be of value in allocat- ing coals for the preparation of domestic fuel for the smoke- less zones. Then again, a close knowledge of the shale and the proportion of shale in the various coals—*e.g.*, size, size distribution, and density should be of great assistance in the allocation of coals to gasworks possessing coke cleaning plant.

Mr. Pickering then congratulated Mr. Brooke on his excel- lent contribution to the proceedings of the Association, and referred to Mr. Brooke's long experience both as a chemist and as an engineer, and particularly mentioned his valuable experience of carbonizing in large retort houses. He brought to his work an excellent combination of knowledge and experience and also possessed in marked degree the qualities of energy, determination, and ingenuity so necessary to the successful prosecution of experimental work of the nature undertaken at the central test works.

By-product Developments at Tottenham—from p. 729.

But he saw no reason why, in the future, they should not do considerably better than they were at the moment. He would say they could probably get down to half what they were doing now.

The author denied Mr. Cuckney's assertion that they did not seem to have an effluent problem. They had indeed such a problem, and they were not so fortunate, as some people were, that they could put it into the river. On Mr. Robinson's question of what the labour savings per ton of sulphate were on the new plant, Mr. Wadsworth said the figures would be cut down to at least 60% and probably nearer to 50% of what they were before they modernized.

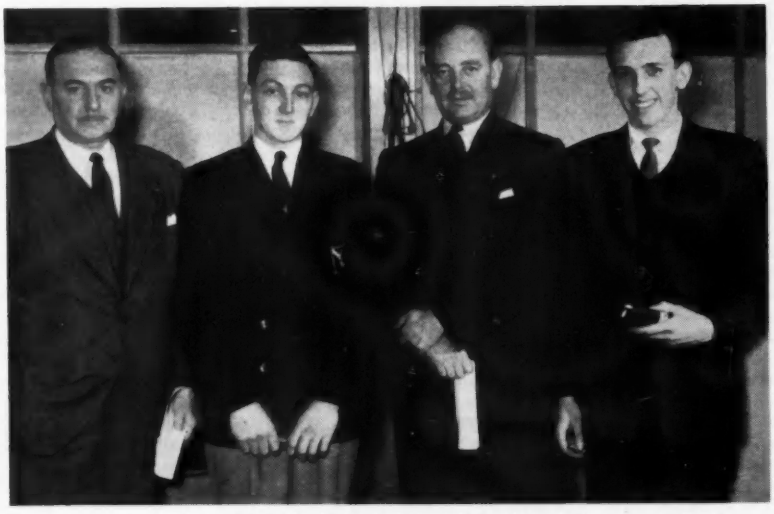
Mr. P. C. Gardiner, Eastern Gas Board, in proposing a vote of thanks to the author, said his paper had been interesting and informative concerning the extensions at Tottenham. But from the tone it might be assumed that all these achievements just happened, and that was not so. As one whose duty it had been to study the development at Tottenham, he would like to say that the success on that by-products plant during the past 15 years or so had been largely due to the work of Mr. Wadsworth.

DIETERICHS MEMORIAL PRIZE WINNERS

Apprentices of the North Thames Gas Board gathered to witness a double presentation of the 'William Dieterichs' Memorial Prize to two of their colleagues who had been judged 'best apprentices' of their term. The prize was instituted in memory of the late Mr. William Dieterichs, and is open to all the Board's apprentices at their three training centres at Stratford, Slough, and Watson House. It is awarded at the completion of each term and takes the form of a personal prize for the winner, and a shield which is engraved with the name of the winner and hung in the workshops where the winner received his initial training.

The two recipients were Eric Gooby (trained at Stratford) and John Weatherley (Slough), and both chose for their prize a set of drawing instruments. These were presented to them by Mr. R. N. Bruce, the Board's Staff Controller, who was introduced by Mr. R. N. LeFevre, Training and Education Officer.

Both lads, who were accompanied at the ceremony by their respective parents, have now completed their initial training, and are working with the fitting staff gaining experience on the district.



In the group are (left to right) Mr. R. N. LeFevre, John Weatherley, Mr. R. N. Bruce and Eric Gooby.

Royal Society of Arts

The Royal Society of Arts has published a list of the successful candidates in its Industrial Art Bursaries Competition for 1954. Thirteen sections, each dealing with a different aspect of industrial design, were included in the competition. One of these, a section for the design of women's fashion wear, was included for the first time. In all, 292 candidates entered from 63 schools and industrial establishments. A record number of 20 bursaries was awarded. In addition to their bursaries 10 winners will also be eligible for Associate Membership of the Society. An exhibition of winning and commended designs will be opened by Sir David Eccles, Minister of Education, at the Society's House, 6-8, John Adam Street, Adelphi, W.C.2, on May 16.

In the domestic gas appliances section, Mr. John Lincoln Fagg (Kingston School of Art, aged 25), who had previously won a bursary of £75 in that section in the 1953 competition, was awarded a bursary of £150. In the section for domestic solid fuel burning appliances, Mr. Thomas Alan Burke (Birmingham College of Arts and Crafs, aged 27) was awarded a bursary of £150, and was also awarded Associate Membership of the Society.

Opencast Coal Contract

The largest single contract for working opencast coal ever to be placed in Great Britain—1 mill. tons larger than the Tirpentwys contract let four months ago—has been awarded by the Opencast Executive of the National Coal Board to Richard Costain, Ltd., London. It is for working 5 mill. tons of coal on the Acorn Bank Farm site in Northumberland, and has been placed by the Coal Board in pursuance of its policy of maintaining opencast output at a high level.

So that the site can be returned to agricultural use as quickly as possible, work will start from the deepest end first. A pair of road tunnels will be laid to the bottom of the 'cut' to allow the coal to be transported to the surface while the site is being worked. These tunnels will be covered over as the work advances across the site, and it will be possible for sections of the site to be restored to farming use progressively from the early days of mining operations.

Under a trade pact between Denmark and West Germany, Denmark will supply up to 6,000 tons of crude tar this year and up to 3,500 tons of natural cryolite, etc., and will receive from Germany a small amount of non-liberalized chemical products.

Radiation Ltd.

The trading profit of Radiation Ltd., for the year ended December 31, 1954, less losses of the Group as shown in the consolidated profit and loss account, amounted to £1,673,284, compared with £1,320,184 for the previous year. After bringing into account investments and sundry income, and providing for depreciation, directors' remuneration, pension payments, etc., the profit for the year subject to taxation was £1,439,109. The adjusted tax liability for the year was £769,448, leaving the net profit of the Group for the year at £669,661, compared with £421,226 for the previous year. Total dividend at 15% is 2½% more than in 1953. The report states that the trading results reflect record production and record sales of products. Group current assets have expanded from £8,281,348 to £8,877,948, and include British Government stocks and other quoted securities £2,256,027 (against £1,830,172 for the previous year), with a market value of £2,259,326 (against £1,841,352), tax certificates £406,600 (£400,000) and cash £858,289 (£1.147.956). Current liabilities and provisions amount to £2,145,878 compared with £2,043,999, bank overdraft of overseas subsidiary of £129,334 having been eliminated. Capital commitments of the Group are estimated at £198,511 (£105,781). Tax negotiations in regard to the basis of stock valuation have been concluded and surplus provision of £57,093 has been transferred to stocks obsolescence reserve.

Glover-Main-Morley Tie-up

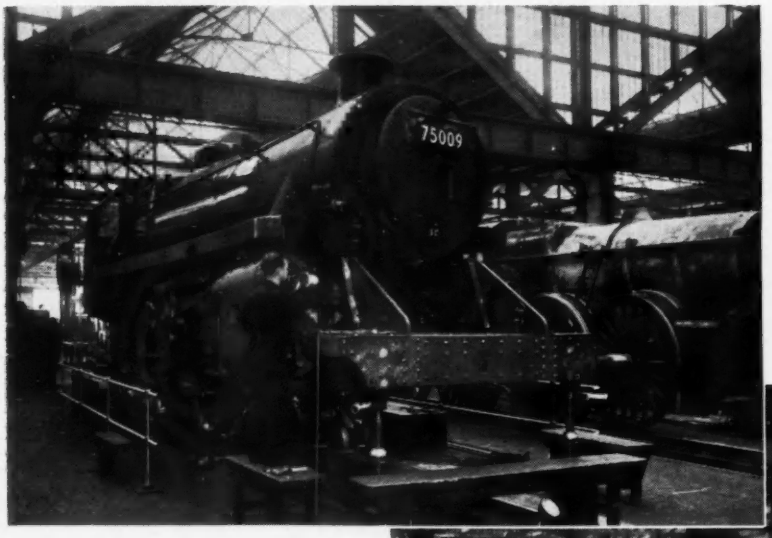
Glover & Main, Ltd., have acquired the whole of the share capital of Morley Products (Padiham), Ltd. Two years ago it was announced that Glover & Main, Ltd., intended entering the refrigeration field, and with this latest tie-up the Group claims that it now has a wider interest in the manufacture of gas-burning appliances than any other firm in the country. Cookers are being manufactured in large numbers at Falkirk and Edmonton, water heaters at Croydon, and meters at Edmonton and other branch works throughout the country. Catering equipment is made at Falkirk, as are also gas fires. Refrigerator cabinets and units are at present manufactured in a pilot plant at Edmonton pending the building of a completely new factory for this product. Washing machines and wash boilers will continue to be made at the Padiham works of Morley Products.

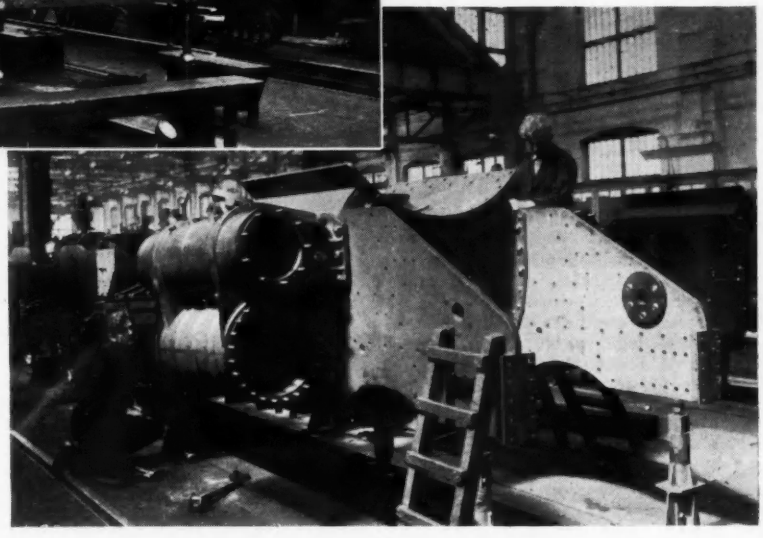
Mr. J. H. Morley will continue as Managing Director of Morley Products (Padiham), Ltd., and it is not intended that there will be any change in the set-up or organization of the Company which will, as before, manufacture and trade as an independent unit. The Glover & Main Group will, however, be able to assist in the supply of certain components, in development, and in expansion of the works to meet the increasing demand for washing machines. Mr. P. D. M. Aird, Deputy Chairman of Glover & Main, Ltd., will be Chairman of Morley Products (Padiham), Ltd.

INSTITUTION OF GAS ENGINEERS

SOUTH WESTERN SECTION VISITS SWINDON

Members of the South Western Section of the Institution of Gas Engineers visited Swindon on March 9, when the proceedings took the form of a tour of inspection of the locomotive and carriage works of British Railways. Mr. W. B. Claridge, Chairman of the Section, presided at a luncheon at the Goddard Arms Hotel which preceded the tour, and the Section was honoured by the company of Mr. C. H. Chester, C.B.E., Chairman of the South Western Gas Board, Mr. James Carr, O.B.E., Deputy Chairman, Mr. C. T. Roberts, Carriage and Wagon Works Engineer, British Railways, Mr. J. J. Finlayson, Manager of the Locomotive Works, and Mr. G. H. E. Bond, Locomotive Assistant to the Works Manager. The Mayor of Swindon (Councillor A. M. Bennett), himself a railwayman, was prevented by illness from attending, and a message of good wishes was also received from Sir William Stanier, who was actively interested in the Swindon United Gas Company and the Great Western Railway before he joined the L.M.S.





Two stages in the construction of B.R. Standard Locomotive Class 4, Type 4-6-0.

Mr. Chester recalled his association with the Swindon Group of Gas Companies from 1931 until 1949, when he became Chairman of the South Western Board, and said the infrequency of his visits since vesting day could be taken as a tribute to the excellent manner in which the staff had looked after the undertaking. When he came to Swindon the undertaking was delivering something of the order of 230 mill. cu.ft. of gas per annum, and today the output was something over 2,000 mill. cu.ft., a terriffic growth within a comparatively short time. The works did not represent the very latest in layout, but the division was one of the most efficient in the whole area. Not only was the cost of gas into holder the lowest in the area, but sales of gas per 1,000 consumers were running very near the top.

It was five years since he left the Presidential chair of the Institution of Gas Engineers, and the district sections were very largely his babies. They were now thriving institutions, and he congratulated the South Western Section in particular on the forthright manner in which it had supported the Benevolent Fund. The engineers were the backbone of the industry, and in the reorganization of the South Western area last April the Board found that not only were the engineers well fitted for their own specialized duties, but by their engineering training they were the best fitted for the administrative and executive control of a very large section of the Board's activities.

Mr. C. T. Roberts, Carriage and Wagon Works Engineer, in welcoming the visitors, said that a complete tour of the works would have involved a 13-miles walk covering an area of 326 acres, but time would not permit of more than a quick look round at features of particular interest.

Mr. G. H. E. Bond, Locomotive Assistant to the Works Manager, showed a series of nearly 50 lantern slides and gave an introductory talk on the main features of the works.

Swindon has been building locomotives for over 100 years, and although none of the buildings in the original works of 1849 remains today, the general plan remains much the same, and the workmen's cottage estate and St. Mark's Church, a landmark from the beginning, still stand. Of the total area of 326 acres, 77 acres are roofed, and the staff employed totals over 10,000, of whom roughly 5,500 are employed in the locomotive works and 4,500 in the carriage and wagon works.

Capacity exists for repairing 1,000 engines a year, building two to three engines per week, repairing 5,000 coaches and 16,000 wagons a year, and building some 250 new coaches. The output of new wagons is equivalent to 5,000 a year of the 13-ton open type. As Mr. Bond emphasized in his introductory talk, a new locomotive is first conceived in the drawing office, and a slide was shown of the locomotive and general section of the Swindon drawing office where a great deal of the pioneer work of the old Great Western Railway was undertaken under the guidance of G. J. Churchward.

The tour of the locomotive works included visits to the iron foundry, which has an annual output of 9,000 castings; the locomotive testing plant used for the stationary testing of locomotives under power; the erecting shop in which new engines are built from components manufactured on the premises, fitted with cranes capable of lifting the largest locomotives, and laid out for repairs on a progressive system; and wheel, boiler,

machine, boiler mounting, stamping and smiths, millwrights, and fitting shops.

In the carriage works the visitors saw the saw mill which turns out an almost endless variety of items required in the building of rolling stock; the fitting and machine shop, in which there are presses ranging from 90 to 500 tons capacity; the carriage body building shop; and the finishing, trimming, and painting shops. About 40 carriages can be housed in the painting shop, which has the temperature maintained at about 60°F. The exterior, and where necessary, the interior painting is carried out by hand, although such components as interior panels, doors, and fittings are spray-painted.

Time did not permit of a visit to the British Railways gasworks, now the only gasworks of its size in the country outside the nationalised gas industry, a similar works formerly owned by the London Midland and Scottish Railway at Crewe having been taken over some time ago by the North Western Gas Board. The Swindon British Railways gasworks comprises continuous vertical retorts capable of carbonizing 240 tons of coal per day and yielding approximately 3 mill. cu.ft. of 450 B.Th.U. gas. Before the gas industry was nationalised, the railway gasworks supplied gas to over 200 houses adjoining the works, but more recently the supply to these consumers has become the responsibility of the South Western Gas Board.

At the close of the tour the members adjourned to the Gas Board's demonstration theatre in Temple Street, Swindon, for tea, at the close of which the thanks of the members to the South Western Board and the Swindon Division were suitably voiced by MR. T. L. TALLENTIRE, Vice-Chairman of the Section.

Forty-eight Years Service with the North Thames Gas Board has come to an end with the retirement of 65 years old Mr. J. Constable, a fitter in the Commercial District. To mark his retirement, a presentation of a cigarette lighter was made to Mr. Constable by Mr. A. A. Jones, the Board's Service Manager for the Central Division, on behalf of Mr. Constable's many friends and colleagues. Mr. Constable has served in the Commercial District for the whole of his long service and was extremely popular with his workmates.

The Sales Division of the Aerograph Co., Ltd., will move at the beginning of April into new offices in the same premises as the De Vilbiss Aerograph showrooms at 47, Holborn Viaduct, London, E.C.1. The factory and head office remain at Lower Sydenham, but sales and technical enquiries will be exclusively handled at Holborn Viaduct. The central location of the new offices will assure better service and attention to customers while the existence of a spacious showroom attached to the office will prove of added interest to all engaged in product finishing.

DOUGLAS GAS SALES DOWN

Speaking at the annual meeting of the Douglas (Isle of Man) Gas Light Company, Mr. W. S. Ward, Chairman, said they were constantly seeking ways and means whereby greater efficiency and economy could be achieved. They had recently purchased an apparatus for the welding of their silica and semi-silica retorts to be used in lieu of the existing patching method, which was the only one available to them. It was anticipated that the new method would extend the life of their retorts.

Mr. Ward stated that the sales of gas showed a decrease, which in the main was attributed to fewer visitors to Douglas, while the net profit remained the same as in the previous year. The coke revenue was better, due to increased sales, a small increase in price, and more efficient grading. The quantity of tar sold was less, due to adverse weather. The reserve fund stood at £41,807. The sale of gas and residuals at £175,754 showed a reduction of £1,764, while rents, £889, were higher by £264. The total revenue for the year was £176,650, compared with £178,147 in 1953.

The combined cost of manufacture and distribution of gas was £147,086, a reduction of £797. More would have been saved but for the disturbing problems of increasing coal prices and higher wages. Management expenses at £10,363 were down by £252. An increase of £202 was shown in the profit of £10,276, which on being added to last year's carry forward of £6,787 made available £17,063, subject to the £4,165 distributed as interim dividend in September.

A final dividend of 9.8d. per share was approved.

NEW MUREX RESEARCH LABORATORIES

New extensions to the research laboratories of Murex Welding Processes, Ltd., at Waltham Cross, represent a further stage in the growth of the laboratories since the first portion was built on the present site in 1938. The Murex research department now covers an area of some 28,800 sq. ft. and is claimed to be one of the most modern and best equipped laboratories of its kind.

View of the new research block from the canteen.

The main purpose of the research laboratory is the development of new and improved electrodes to meet the increasing application of metal-arc welding, although the work of the department can be sub-divided, broadly, into four main categories: (1) Basic research into problems associated with the raw materials used in the manufacture of metal-arc electrodes and with the application of the arc-welding process itself; (2) the development of new electrodes for new or unusual applications; (3) the control of electrode quality and the development of methods for facilitating the control of the quality of incoming raw materials and of the final electrodes; and (4) technical service to customers and co-operative research with certain other research associations and organisations.

The library is well equipped with reference books and receives a large number of technical journals each month.

The research department is housed in a single storey building having a welded steel frame with Vierendeel and lattice girders supporting the larger spans. It has cavity external walls faced with Uxbridge flint bricks. The roofing varies from steel decking to precast concrete slabs and hollow pots. All portions of the roof are covered with cork insulation and weatherproof mastic-asphalt. The floors are of concrete covered with granolithic finishes, tiles, composition, acid resisting asphalt or linoleum, according to the function of the particular section. Experiments were made to determine the best colour scheme for those sections of the laboratory in which welding is carried out, and Myosotis blue with a reflectivity of about 1/10th of white paint was chosen. This colour generally predominates throughout the department, with all pipe lines painted in the appropriate British Standard colours.

WALES BOXING CHALLENGE

In 1932 a small band of enthusiasts formed the Cardiff Gas Amateur Boxing Club. One of the prime movers was 'Pop' Gallie, who was employed at the Grangetown works for nearly 50 years and has been the treasurer of the club since its inception. The Gallies are a gasworks family, and the elder son Alf, himself a well known amateur boxer in his day, worked there for 20 years and gave yeoman service to the Club until his outstanding ability as a trainer was recognized and he became coach to Oxford University, a position he still holds. He was selected by the British Amateur Boxing Association as official coach to the British Olympic Team at Helsinki. His training duties have been taken over by his more famous younger brother Cyril, one of the finest amateurs ever to hold a British title, and who subsequently became a star professional.

The training duties are shared by another gasworks employee, Jack Pottinger, who brought many honours to his club, including Welsh and British titles, and who fought in America for Great Britain in the Golden Gloves contests. Members of the club have between them won 51 British A.B.A. titles and well over 100 Welsh titles. In addition they have represented Great Britain in many international contests.

Three members have been selected to represent Wales in Switzerland later this month, and the Secretary of the Cardiff Gas Boxing Club, Mr. Charles Fearnley, a son-in-law of 'Pop' Gallie and a district representative with the undertaking for many years, has been appointed team manager for the Welsh boxers.

The President of the Club is Mr. John Powdrill, General Manager and Engineer of the Cardiff undertaking, who is seen in the photograph with members of the club who have represented Wales this season, and with club officials.

The combination of such a galaxy of talent and native Welsh enthusiasm makes the club too tough a proposition for any other single gas undertaking to take on, but it may be that some of the area boards would care to try conclusions with the club, and a sporting challenge is issued to any area board who might be interested enough to put up a team.

Mr. John Powdrill (seated in the centre) with officers and members of the Cardiff Gas Amateur Boxing Club.

SCARBOROUGH CONFERENCE

The National Smoke Abatement Society has published at 7s. 6d. the *Proceedings of the Scarborough Conference, 1954*, a 114-page record of the Society's 21st annual gathering at which Sir Ernest Smith's Presidential Address was followed by an address by Sir Hugh Beaver, Chairman of the Committee on Air Pollution, whose final report has since been followed by the Government's promise of clean air legislation during the present Parliamentary session. The report includes the fifth Des Voeux Memorial Lecture by Sir Edward J. Salisbury, Director of the Royal Botanic Gardens, Kew, on 'Air Pollution and Plant Life' and the series of papers on the impact of rail transport on the problem of smoke abatement, by Mr. R. F. Harvey, Chief Officer, Motive Power, British Railways, and developments in the industrial use of gas and electricity respectively, by Mr. R. F. Hayman, Industrial Gas Officer of the Gas Council, and Mr. J. I. Bernard, Chief Technical Officer of the British Electrical Development Association. The discussions on the papers are included and are of interest for the additional information they contain.

The 2,000th House to be erected since the end of the war by the Romford (Essex) Council, in the area of North Thames Gas Board, was formally opened by Alderman Alec McGonagle, Mayor of Romford. The tenants, Mr. and Mrs. Ron Edwards, have chosen a Radiation 75 gas cooker for their new home.

Sequel to Accident at Litchurch Gasworks

Two gasworks contracting firms were sued by Mr. Terence Fitzpatrick, of Alvaston, at Derbyshire Assizes on February 22. The plaintiff claimed damages for personal injury arising from an accident at Litchurch gasworks, Derby, in July, 1952. The firms were Humphreys & Glasgow, Ltd., the plaintiff's employers, and the Woodall-Duckham Construction Co., Ltd.

Mr. A. J. Flint, for Mr. Fitzpatrick, said that damages had been agreed at £850, and the issue before the Court was the question of deciding what proportion each firm should pay. After hearing evidence, Mr. Justice Jones ordered Humphreys & Glasgow, Ltd., to pay one quarter of the damages and the Woodall-Duckham Construction Co. to pay three-quarters.

Giving judgment, his Lordship said that Humphreys & Glasgow, Ltd., had been, on the date of the accident, responsible for the erection of new gas plant, and Mr. Fitzpatrick had been scraping, for the purpose of painting, an article which, said the Judge, 'has been called by various names, but which I am going to call the upper boiler. This had been lowered by a crane on to the top of what he would call the 'lower boiler.'

The final fixing of the article in position had to be deferred, however, until other work had been done. The eventual intention was that the upper boiler should be secured by six lugs to be cemented in, but that had not yet been done, and meanwhile one boiler rested on the rim of the other. The plaintiff's exact position had not been stated, said the Judge, but while he was at work on the upper boiler a crane belonging to the Woodall Duckham Construction Co. was put into operation to remove a girder that was lying near the legs supporting the lower boiler. While being lifted, the girder swung and struck one of the legs. Simultaneously the upper boiler tilted, and Mr. Fitzpatrick was injured.

The Judge added that the Court had not heard the nature of the injuries because the amount of the damages had been agreed. The plaintiff alleged that both defendants had been negligent. The Judge found that 'the principal substantial was the negligence of the second defendants in not managing the crane properly.'

Gas Cooker Safety.—An appeal to fit gas cookers with spring loaded safety taps to prevent gassing accidents in existing houses as well as future houses was made by a member of Fife County Council. He was referring to a decision of the Council's Housing Committee to install new safety cookers in all future dwellings at a cost of £17 10s. per house. 'We have 10,000 houses under the Council,' he said, 'and some of these are occupied by old age pensioners. It is the duty of the Council to consider the installation of these cookers not only in future houses but in existing ones.'

GAS CONSULTATIVE COUNCILS

Coke Scarce in South Western England

Complaints of a coke shortage during the recent severe weather were made to the South Western Gas Consultative Council at Taunton on March 2 and it was stated that the national campaign against 'smog' had made people coke-minded. Mr. W. J. Baker, (Member of the South Western Gas Board) said there had been many complaints, chiefly from Cornwall, about the shortage of medium size coke, but the demand for this grade had exceeded the supply over the whole area and the Board could not do anything about it. There had been ample quantities of another grade, which could be used in many cases for the same purposes. For about a fortnight before Christmas the Board was between three and four weeks behind with deliveries, and the same applied to the coal industry. The national Press campaign against 'smog' had resulted in a lot of people becoming coke-minded. That had created an unexpectedly big demand for coke, on top of which there had been two very cold spells. Just before Christmas the Stapleton Road works, Bristol, was 21,000 bags behind in delivery. 'It is something we have to get to grips with before next winter' said Mr. Baker. 'We hope to improve distribution methods and to be more on our toes than we were this time.'

Mrs. L. Newbery (Plymouth) said they were begging people to use coke fires and when they made the change they could not get the coke. Probably by next year or the next blizzard they would be able to cope. Another member said when they considered the weather conditions and transport difficulties, the ordinary chap who had been lumbering round solid fuel had been a hero. Mrs. Newbery replied 'Do not let us be sentimental. You cannot build a business on sentiment. You can apply that argument to the milkman, the baker, and everybody who delivers. We did not win the war on sentiment, but on practical knowledge of how to get things done. Let the Board realize it has a crisis and get down to it.'

Mr. G. W. Powell (Amberley) said the problem of getting coke had been aggravated by the centralization of the gas industry. In the old days people got coke from the local gasworks, but many of these had now been closed down. If the Board reduced the summer price for coke people would stock up then as they did with coal.

The Chairman, Mr. A. W. Loveys, said the Board had to pay the same price for coal all the year round.

Arising out of a discussion at the previous meeting about a suggested cooker re-conditioning service, Mr. W. J. Baker said that the Gas Board already had a complete reconditioning scheme under which cookers could be brought to the workshops and be overhauled. He saw no reason why it should not be slightly extended, so that any consumer who was prepared to pay for cleaning or renovation could have the work done, on request, in her own home. Some cookers could be dealt with in the home and others would have to go to the workshop. Charges would vary according to the service needed, but he thought the cost could not be less than £1 per cleaning. Labour was expensive and an increased staff might be needed if there were many requests for the service.

Mr. H. Morland, a member of the Council, said that at the last meeting he referred to a lot of separate accounts being sent by the Board to each consumer, but his firm (Clark, Son and Morland, Ltd., Glastonbury) now received one quarterly account for all its meters. He believed, however, that the Glastonbury Borough Council received as many as 27 accounts. He suggested a quarterly account for all the meters belonging to one authority.

The Secretary (Mr. A. A. Murrell) produced a letter from the Board on this subject. It stated that the Chief Accountant had given considerable thought to the matter and the Board agreed that the service, provided it did not have far-reaching effects, could be given to consumers on request without additional charge. The Board would require to know which meters it was desired should be read on the same day and amalgamated into one account.

Mr. W. J. Baker pointed out that meters were being read continuously. As an instance he said that if the Bath City Council wanted all its meters read on one day, it would mean taking a man away from a group of readers and if that happened all over the area it could dislocate the system. But the Board saw the necessity and it could be done on request for some of the larger concerns.

Replacing Domestic Coal

Interposing during his address to the North Thames Gas Consultative Council in London on February 24, Dr. G. E. Foxwell, a member of the Beaver Committee, said he had received a letter from Sir Hugh Beaver calling attention to reports in the Sunday papers concerning dissatisfaction about coke burning. There was a shortage of coke and people were complaining that they had been given coke they could not use.

Said Dr. Foxwell: 'It is almost unavoidable I think. You have the people's conscience stirred, people anxious to try out the new ideas and who feel it is their duty to do so. Where you have adequate supplies of coke and the proper grates that is admirable, but a great deal of harm will be done if people run off too soon, use up the available supplies of coke, and become first lukewarm and then against us.'

The problem that Dr. Foxwell first dealt with to the Council (in his address) was how to replace domestic coal by smokeless fuel. There was only a limited amount of fuel available for the present and it would take time to install the appliances for burning it. So the Beaver Committee had decided that the main and immediate attack should be directed upon areas susceptible to fog in which there was also a high rate of smoke emission.

In tackling the problem, the Committee believed that people must be persuaded, not dragooned. 'In practice, this means that they must be satisfied with the change when it is made. They must find, in particular, that they get at least the same degree of comfort from smokeless fuels as from coal and that the cost is not such as to cause embarrassment to those with modest incomes. This throws direct responsibility on to the fuel industries, including the appliance manufacturers, and on to the local authorities.'

Dr. Foxwell said that when all available stores of fuel had been ransacked, there was still a deficiency, mainly of fuel for the open fire. Only 9 mill. tons out of the 19 mill. tons was accounted for and they had to find replacements, allowing for some unsatisfied demand, for another 10 mill. tons.

'For this we turned to the gas industry. To replace the first 9 mill. tons we had already raided the gas industry by agreeing with the Gas Council that some 4½ mill. tons of gas coke could be transferred from industry and replaced there by oil or coal unsuitable for carbonization.' This transference of coke represented a major operation for the gas industry since it meant withdrawing coke from well-established markets to supply a domestic user who had not previously had experience of the use of coke, and who frequently maintained that coke was unsatisfactory in the domestic grate.

To meet the deficiency, they had to ask the gas industry to arrange to carbonize possibly as much as an additional 10 mill. tons of coal a year. But having provided the fuel on paper, that did not end their difficulties. These were that coke, particularly in the north of England, is regarded as an unsatisfactory fuel; it is variable in combustion properties; it is difficult to ignite; it is sluggish in response; it cannot be burnt at all on some older forms of coal-burning grate; and excess water and ash, including spitting are common-place. 'It was evident that coke had acquired a bad name, largely because the gas industry had neglected it, and this would require to be altered,' he asserted.

Dr. Foxwell, speaking of the part to be played by the local authorities, said on them would devolve the organization and administration of smokeless zones. Their proposals, in effect, left the decision whether an area was to be smokeless or not to local option. The first responsibility of the local authori-

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ties, therefore, was that of educating the public and of persuading them that clean air was good for them. 'I do not doubt that many other bodies will assist in this educative process.'

When it was clear, he continued, that an area could be made smokeless, it was then necessary that the local authority, with the co-operation of the fuel industries, the fuel merchants, and other appropriate organizations, should ensure that there was an adequate supply of suitable fuel, that appliances were installed wherever necessary before the date when the zone was to come into effect and that there were arrangements for the supply of the fuels.

'I am a little disturbed' he continued, 'by the number of smokeless zones which are being instituted in advance of the official arrangements. The gas industry, by and large, has not yet made arrangements to manufacture coke of suitable quality; in many areas it has been done, but in others it has not. Nothing could be more disastrous than for a number of smokeless zones to be instituted up and down the country and for them to prove failures because the right appliances and the right fuel are not available in sufficient quantities.

'It will also be necessary to arrange for an adequate advisory service to show consumers how to burn the fuel provided, how to operate the modern appliances provided, and to assist them should they run into difficulties.

'There have already been examples in the country of dissatisfaction caused through coke-burning appliances not having been fitted with gas ignition; through local authorities "economizing" by installing cheap and unsatisfactory appliances; through lack of suitable fuel; and through lack of adequate preliminary propaganda.'

Dr. Foxwell went on to say that experience with such areas as the Clifton Housing Estate at Nottingham showed that given good organization and a little time to get over teething troubles, no difficulties would be encountered. There was a great deal to be said for arranging for any smokeless zone to be instituted, preferably in the early summer, when there was time to remove difficulties.

Dr. Foxwell answered questions put to him by those present, who included members of local authorities specially invited. Mr. Gerald Nabarro, M.P., who was to have been there to support Dr. Foxwell, was unable to attend because of Parliamentary commitments. But the Chairman, Councillor E. Bayliss, said Mr. Nabarro would be attending a future meeting.

East Kent Integration Plans

Mr. R. Prince, Chief Engineer of the South Eastern Gas Board, addressing a meeting of the South Eastern Gas Consultative Council at Caxton Hall, Westminster, on March 1 (under the Chairmanship of Councillor A. B. Constable), gave further details of the Board's 12-year re-organization and development programme, with special reference to integration in East Kent. He recalled that when he explained the programme to the Council last July he said how essential it was that a long-term programme—or 'master plan'—should be drawn up, if high technical efficiency was to be maintained and wasteful capital expenditure avoided in meeting the demand for gas, while at the same time effecting economies by co-ordinating the large number of supply units into an integral whole, as visualized by the Gas Act. He showed how the Board's plan stemmed from its geographical location, enabling seaborne coal to be accepted direct at its major manufacturing stations and how these stations would be interlinked both with each other and with the inland districts of supply.

The programme was by no means a rigid one and had been drawn up in such a form as to enable adjustments to be made from time to time and to allow for more detailed schemes to be fitted in to the larger 'master plan.' He had outlined the broad plan for the area as a whole, illustrating those works which were to be retained and extended and those at which manufacture would not continue. In particular, when he dealt with Kent he said that the existing bulk supply main from Dover to East Kent was being replaced by a main of rather larger size and on an amended route, in order to provide better gas supplies; that the reconstructed Dover works would supply this main as well as affording supplies to Deal and Folkestone. He also showed that the Board had interlinked Westgate, Margate, Broadstairs, and Ramsgate with each other.

The purpose of his present address was to give a further development of the Board's plans to integrate that part of Kent which was now known as the Dover Engineering Division and which had been formulated under the direction of the Divisional Engineer, Mr. Clark. Owing to the increasing shortage of good quality gasmaking coals and the high capital cost of carbonizing plant, it was decided that in the future planning of works carbonizing plant should not form more than 50% of the total plant, the balance of required capacity being obtained from water gas or oil gasification plant. It had been seen that on this basis the Dover works could be so developed as to meet the requirements of the whole of that Division, with the exception, for some time to come, of Canterbury, which would receive only part of its requirements from Dover. This meant that gas would not be manufactured at Deal and Folkestone after the autumn of 1955 and that Ashford, Faversham, Herne Bay, Margate, Ramsgate, and Westgate would be closed down at varying dates between 1956 and 1958. As an added safeguard against breakdown, or exceptional peak loads, these integrated works would be connected in the near future, via Sittingbourne, to the bulk supply mains which were to be run through from the London interlinked system of supply to Rochester.

A reduction in labour employed on gas manufacture was inevitable. Wherever possible alternative employment would be offered to longer service employees and where this was not available claims could be made under the compensation regulations of the Gas Act either for loss of employment or diminution of earnings. The Board, however, had a well-understood agreement with the trade unions concerned whereby every individual case was considered and affected employees were interviewed by an officer of the Board, assisted by the men's trade union representative. Officers of the Ministry of Labour and National Service were kept advised when the displacement of employees was likely to arise and they were usually able to offer alternative employment when works actually closed down.

Some additional plant was required at Dover to meet the increased load on that works, but the cost of this, combined with the cost of the mains required to link the various works, was rather less than the cost of plant which would fall due for replacement at those works over the next 10 years period, while the Board was satisfied that considerable economies would be made in operational costs.

The Shilling Shortage

A suggestion that tokens should be introduced for prepayment gas meters to overcome the shilling shortage was put forward at a meeting of the East Midlands Gas Consultative Council in Nottingham on March 1.

Councillor H. Cant (Grantham), who raised the matter, put forward an alternative suggestion that the Board should be requested to consider the installation of dual coin (6d. and 1s.) meters. Commenting on a statement that to meet this difficulty arrangements had been made for shillings to be available on request in gas showrooms, he said that if he told everyone that the Grantham gas office would be unable to cope with the demand.

Mr. Sydney Smith, Chairman of the East Midlands Gas Board, suggested the remedy was simple. A consumer could obtain shillings by giving the collector a pound note in exchange for 20 shillings, or money equivalent to that taken from the meter.

Mr. Haslam Wood, Chairman, said to adapt meters to take sixpences would be a complicated problem. He thought the public should have more shillings available and that it was a matter for the Government.

Mr. Smith said representations were made to the Mint for extra shillings a year ago and there was no reason why this could not be done again. The Council decided to leave the matter with the Board to devise means of getting more shillings available.

Referring to the need to reduce gas pressures during February in Sheffield,

Mr. Smith said at vesting day gas was rationed, but during five winters they had increased the gas available by 43.5%. One reason for shortage of gas in the area was the short supply of steel holding up new plant projects in the area, and consequently holding up increased gas supplies. When plants at Neepsend (Sheffield), Car House (Rotherham), Grimesthorpe, and Meadowhall (Sheffield) were completed output would be increased by 20 mill. cu.ft. a day. By the end of the year they hoped to have 12 mill. cu.ft. per day available and the remainder by 1957.

On a question of whether the coke ovens were coming up to expectations, Mr. Smith said the supply from coke ovens was reduced on account of the cold weather, but he could not see that any criticism could be levelled at them for reduced output because of the adverse natural conditions.

Steel Shortage Causes Delays

The Northern Gas Consultative Council at its meeting at Newcastle on March 7 unanimously approved a resolution from the Tyneside Divisional Consumers' Committee asking the Northern Gas Board to frame a plan with industrial consumers which in an emergency could be put into operation to ensure the maintenance of a safety level in gas supplies with the least possible interference with industry.

In a statement to the Council on the reduction in gas pressures on Tyneside during the cold spell in January, Mr. E. Crowther, Chairman of the Board, said that one of the main reasons was that the Board's planned construction had been delayed by the extremely severe rationing of steel imposed on the gas industry three years ago. The Board was restricted to less than 40% of its planned requirements of steel for all purposes.

This had particularly affected the latest unit to be added, a carbonizing plant of about 4,500,000 cu.ft. per day, at the Redheugh works. It had been ordered in December, 1951, but its construction had been delayed by lack of steel. By February the new plant at Redheugh was making an effective contribution and the Board was able to meet higher demands than those it could not wholly meet the previous month. This showed that the Board's constructional programme which had added 21 mill. cu.ft. per day to Tyneside's production capacity had accurately matched the rise in demand.

Other reasons for the reduction in pressures during January were the fact that bad roads delayed domestic coal deliveries and many thousands of houses used gas ovens as space heaters, the accelerated housing programme had brought new consumers, and increased industrial productivity had meant bigger gas demands. In some cases industrial and commercial undertakings had lengthened their working hours and added to their gas-using equipment without telling the Board.

A linking main now completed enabled surplus gas to be delivered into the Tyneside area from across the Wear. This work had been held up due to the delay in obtaining Parliamentary authority to attach the pipes to the Queen Alexandra Bridge at Sunderland.

Measures in addition to the Redheugh plant for the provision of a further 18 mill. cu.ft. per day within the next three years were outlined by Mr. Crowther. He said that agreements had been made with the National Coal Board to buy an additional 4½ mill. cu.ft. per day from coke ovens scheduled for completion in the late summer of this year and a further 6 mill. cu.ft. per day was to be obtained from the similar extension of the N.C.B. Monkton (Jarrow) ovens next year. A new coking plant at Murton would supply 7½ mill. cu.ft. per day by the autumn of 1958. Two new carburetted water gas plants were expected to be available before the end of the year and so far as additional storage capacity was concerned a 3 mill. cu.ft. holder was almost complete.

The Tyneside Consumers' Committee felt that closer contact between industry and the Board both with regard to extension of consumption and restriction of consumption might help. Mr. Crowther pointed out that industry would be well advised to consult with its essential services before increasing consumption by adding other plant and not assume that however much the demand increased the supply would automatically be there.

Alderman Joseph Hoy, Chairman, said that he could understand how difficult it had been for consumers at the time of the gas shortage. Despite herculean efforts in the industry there was no doubt that production had not met the demands. 'I want to reject the suggestions by some critics that this was caused by the stupidity or inertia of the Board,' he declared.

The January events had proved beyond any doubt that the Board would have to do some more thinking on its capital expenditure and what the effects of this would be on price structure he could not foretell. The consuming public, however, had demanded a plentiful supply of gas and it was the prime duty of the Board, so far as possible, to fulfil it. He was satisfied that the steps started by the Board would go a long way towards achieving this first essential. He stressed that it was essential that there must be some closer form of liaison between the heavy consumers and the Board, even if that meant some form of load shedding.

Alderman L. Taylor, Middlesbrough, pointed out that the breakdown seemed to have been confined to Tyneside and that no complaints of inadequate gas pressures had been received from the Tees-side Division during the cold weather.

The meeting approved a resolution from the Tees-side Divisional Consumers' Committee that the Consultative Council should support the efforts of the Beaver Committee by requesting the Chancellor of the Exchequer to remove purchase tax on domestic heating appliances.

Didcot Gasholder Delay

The view was expressed at a meeting of the Southern Gas Consultative Council at Reading on March 2 that long delay in the installation of a new gasholder at Didcot, Berks, is reacting unfairly on consumers in the area. It was therefore decided to send a resolution to the Southern Gas Board urging it to give immediate consideration to a request, made in September, 1954, to implement means of overcoming the difficulties. On the previous occasion the Council was told that consumers in the Didcot area were not paying prices which were a true reflection of the manufacture of gas. The Council was now told that the delay in putting the new Didcot holder into operation was due to the Gas Board's refusal to accept it from the contractors in its present condition. Consumers had been led to hope that it would be operating early this year, but due, it was alleged, to certain defects, it would probably be another six months before it could be approved as satisfactory.

The Southern Gas Board's proposals for the erection of a new gasholder station and works at Cowley, Oxford, were brought to the notice of the Council. It was told that Oxford's gas supply could be assured until the new works were completed in, it was hoped, 1959.

The Council considered a report of the Standing Committee which had been investigating a spares service to consumers by the Southern Gas Board. It considered the supply of spare parts for old and pre-war gas appliances and was assured that in cases where these were unobtainable from the makers, the Gas Board was taking steps to satisfy the consumers' demands either by manufacture in its own workshops, or by placing orders with local foundries. In the meantime, added the report, efforts were being made to minimize inconveniece to consumers by installing temporary appliances.

Although it had closely studied a report on air pollution, the Council had decided that there was nothing it could do at the moment to help overcome the 'smog' problem. Mr. F. C. Rea, Chairman, commented: 'We know, of course, that gasworks do smell and that it is often very unpleasant for people, but there is nothing detrimental to public health. Terrific care has been taken on that point.'

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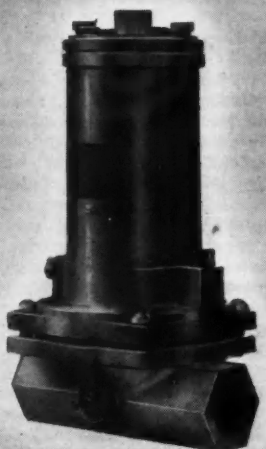
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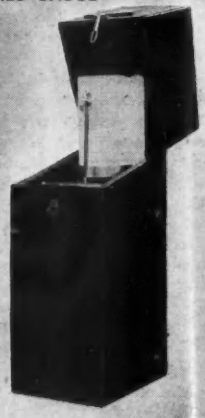
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Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 2/- per line (approx. 7 words)—minimum charge 10/-. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

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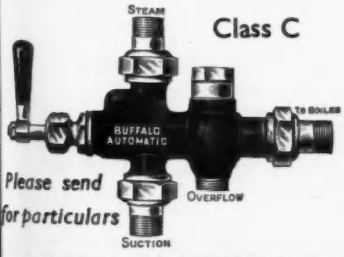

Class C

Please send for particulars

GREEN & BOULDING, Ltd.
162a Dalston Lane, London, E.8

"KLEENOFF" *
THE COOKER CLEANER

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FIBRE BRUSHES
RUBBER MOPS

"KAY-DEE" *
KETTLE DESCALER

* retail to the public, and in bulk for works use.

SALE & CHURCH, LTD.
7, CROMPTON WAY, CRAWLEY, SUSSEX

ROOK BROS. LIMITED
FOR—

Every aspect and requirement connected with the

STRUCTURAL STEELWORK
of
GASHOLDERS
and
GASWORKS PLANT

ENQUIRIES INVITED,
32, Collier Row Lane,
ROMFORD, Essex.
Tel.: Romford 5174

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

WALES GAS BOARD

BARRY UNDERTAKING—
DISTRIBUTION SUPERINTENDENT

APPLICATIONS are invited for the above position. Minimum qualification Ordinary Grade Institution of Gas Engineers or equivalent.

Applicants should possess sound practical experience in modern High/Low Pressure Gas Distribution and Utilisation. Familiarity with the preparation of schemes and estimates in relation to housing development, etc., is essential together with a knowledge of estimating and costing in connection with central heating and bulk hot water supplies, as well as a knowledge of recent legislation affecting gas undertakings.

The salary will be within Grade A.P.T. 8, Provincial 'A' (Scale £625-£705) and the person appointed will be required to satisfactorily control the Distribution Department, and to perform the duties usually associated with the position. The post is pensionable. A house will be made available at a reasonable rental.

The successful applicant will be required to pass a medical examination.

Applications stating age, qualifications, experience and present position, together with the names of two referees should be received by the undersigned within fourteen days of the appearance of this advertisement.

S. D. COOLE,
Engineer and Manager.

Wales Gas Board,
Barry Undertaking,
Broad Street,
Barry, Glam.
March 7, 1955.

SOUTH EASTERN GAS BOARD

TECHNICAL ASSISTANT TO
DISTRIBUTING ENGINEER
ROCHESTER DIVISION

APPLICANTS should possess the Higher Grade Certificate in Gas Engineering (Supply) of the Institution of Gas Engineers or the Higher National Certificate of the Institution of Mechanical Engineers. They must have had experience in the operation of high and low pressure main systems and preferably drawing office training.

Salary within Grade 9 (Provincial 'A')—£655-£755 per annum.

Applications in writing, quoting reference V10/523 and giving full details should reach the undersigned within fourteen days.

R. J. McCRAE,
Personnel Manager.

Katharine Street,
Croydon.

SOUTH EASTERN GAS BOARD

SHIFT SUPERINTENDENT,
EAST GREENWICH WORKS
METROPOLITAN DIVISION

PREFERENCE will be given to candidates who have obtained the Higher Grade Certificate in Gas Engineering (Manufacture) of the Institution of Gas Engineers, or equivalent qualification. They should be capable of controlling the gas production of the Works.

The successful applicant will be required to take charge of the Station and be responsible for the Divisional Gas Production control outside normal office hours.

Salary within Grade 10 or 11 (Met. Area)—£745-£845 or £770-£895 per annum, according to qualifications and experience.

Applications in writing quoting reference V10/526 and giving full details should reach the undersigned not later than fourteen days after the publication of this notice.

R. J. McCRAE,
Personnel Manager.

Katharine Street,
Croydon.

EASTERN GAS BOARD

WATFORD DIVISION
APPOINTMENT OF DEPUTY ENGINEERING (CRAFTS—INCLUDING ELECTRICAL) FOREMAN—LUTON WORKS

APPLICATIONS are invited for the above post. Applicants should be between the ages of 30 and 40 years and preferably have experience of general mechanical and electrical maintenance work in a large gas works, besides the ability to direct and supervise skilled craftsmen.

The successful applicant's salary will be within Salary Grade A.P.T. 6 of the Agreement of the National Joint Council for Gas Staffs ('Fringe' Met.—£550 to £630 per annum).

The person appointed may be required to pass a Medical Examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications should be made in writing to the undersigned not later than March 26, 1955.

R. SUMMERSON,
Works Engineer.

Gas Works,
Dunstable Road,
Luton, Beds.

(*Classified advertisements continued on page* 742)

APPOINTMENTS VACANT (ctd.)

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION
DISTRICT INSPECTOR,
RUGBY DISTRICT

CANDIDATES must possess a sound knowledge of Domestic Appliances, Gasfitting and Consumer Service generally, and should hold the City and Guilds of London Final Certificate for Gasfitting.

The salary will be within Grade 5 (£500-£580 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. A. Allen, Divisional General Manager, West Midlands Gas Board, Gas Street, Coventry, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION
SENIOR ENGINEERING DRAUGHTSMAN
COVENTRY DISTRICT

APPLICATIONS are invited for the above post in the Constructional Engineering Department, which is located at "White Cottage," 970, Foleshill Road, Coventry.

Candidates should have experience in engineering and structural work and should be competent to carry out surveys, prepare drawings, specifications and estimates. It will be an advantage if this experience has been gained in a gas plant contractor's drawing office.

The salary will be within Grade 10 (£715-£815 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, giving particulars of age, qualifications and experience, together with the names of two referees, should be addressed to Mr. A. Allen, Divisional General Manager, West Midlands Gas Board, Gas Street, Coventry, to reach him within fifteen days of the appearance of this advertisement.

J. C. INGRAM,
Secretary to the Board.

NATIONAL COAL BOARD

EAST MIDLANDS DIVISION
CARBONISATION AND
BRIQUETTING DEPARTMENT

APPLICATIONS are invited for the following posts at the new Avenue Carbonisation and Chemical Plant :—

ASSISTANT CHEMICAL PLANT MANAGER

Applicants should have a thorough knowledge of the principles of chemical engineering and industrial chemistry. The work covers control of labour, benzole rectification, tar distillation, sulphuric acid and sulphate of ammonia manufacture and gas purification ; experience in some or all of these is desirable.

ASSISTANT COKE OVEN MANAGER

Sound experience of large coking plants and control of labour is essential and a knowledge of coal blending and secondary chemical plant desirable.

The salaries are in accordance with experience and qualifications.

Applications to Administrative Officer, N.C.B. Carbonisation and Briquetting Department, P.O. Box 16, Grassmoor Colliery Offices, nr. Chesterfield, Derbyshire, not later than fourteen days after publication.

EAST MIDLANDS GAS BOARD

NOTTS AND DERBY DIVISION
FIRST CLASS GAS FITTERS
BURTON-UPON-TRENT AND
HEANOR DISTRICTS

THERE is a vacancy for a FIRST CLASS GAS FITTER in each of the following Districts :—
Burton-upon-Trent
Heanor, nr. Derby
Rate of pay : 3s. 9½d. per hour.

Accommodation is available under a Service Occupation Agreement.

Applications stating age, qualifications, experience and present position, together with the names of two referees should reach the undersigned not later than March 19, 1955.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts & Derby Division,
P.O. Box No. 62,
Friar Gate,
Derby.

EAST MIDLANDS GAS BOARD

NOTTS AND DERBY DIVISION

APPLICATIONS are invited for the following appointments :—

SENIOR HOME SERVICE ADVISER—
DERBY DISTRICT

Candidates must hold a recognised diploma in cookery and domestic science and have the necessary practical experience. Applicants should also be capable of arranging demonstrations and addressing consumers in the use of domestic gas appliances.

The salary will be within Grade A.P.T. 7 (Female) of the National Salary Scales (£468-£532), according to qualifications and experience.

The successful applicant will be responsible to the District Manager for the organisation of this section.

HOME SERVICE ADVISERS OR TRAINEES are required in the following Districts :—
Nottingham, Derby, Mansfield
Chesterfield, Heanor and Newark.

HOME SERVICE ADVISERS

Candidates must be capable of working independently and be in possession of a recognised diploma for cookery and/or domestic science.

They should be proficient in the practical demonstration of gas cooking, laundering and other appliances and be able to advise consumers in the use of all domestic gas appliances.

Salary range : £308-£464 per annum.

TRAINEES

Candidates should have spent some two or three years at a Domestic Science Training College or similar Institution, and possess a recognised diploma or qualifications in domestic science.

After a period of training to enable her to acquire a knowledge of the gas industry and gas appliances, the successful applicant will be eligible for transfer to the status and salary of a Home Service Adviser as above.

Salary range : £204-£308 per annum.

The positions are pensionable and the successful applicants will be required to pass a medical examination.

Applications stating age, qualifications, experience and present position, together with the names of two referees, should reach the undersigned not later than March 19, 1955.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts and Derby Division,
P.O. Box No. 62.
Friar Gate,
Derby.

EAST MIDLANDS GAS BOARD

TWO FIRST CLASS FITTERS REQUIRED

Appointment A.—One for the Melton Mowbray (Leics.) district. Service Occupancy of flat (not at Works) available on reasonable terms.

Appointment B.—One for the Wellingborough (Northants) district. Service Occupancy of flat on district Holder Station available on reasonable terms.

J.I.C. conditions and rate of pay (Provincial 'A') apply.

Applications are invited and these, stating age, experience and qualifications and giving the names of two referees, should reach the Divisional General Manager, E.M.G.B., Millstone Lane, Leicester, not later than March 28, 1955. Applicants should state whether they wish to be considered for A, B, or either appointment.

SCOTTISH GAS BOARD

LANARKSHIRE DIVISION
SENIOR ENGINEERING ASSISTANT

APPLICATIONS are invited from suitably qualified persons for the position of SENIOR ENGINEERING ASSISTANT. The party appointed will be responsible for the planning and execution of all plant installations, buildings and reconstruction within the Division and should have had previous experience in work of a similar nature.

Applicants should possess an Engineering Degree or equivalent in Civil or Mechanical Engineering, and preferably be a Corporate Member of the Institution of Gas Engineers.

Salary will be in accordance with A.P.T. 11—£740-£865—of the National Scale of Salaries for Gas Staffs, with placing according to experience and qualifications.

Applications stating age, qualifications, present position and previous experience, together with the names of two referees to reach the undersigned in a sealed envelope endorsed 'Senior Engineering Assistant' not later than Monday, April 4, 1955.

JAMES M. DOW,
Divisional Controller.

Divisional Offices,
Bothwell Road,
Uddingston.
March 1, 1955.

DOMESTIC
UTILISATION OF GAS

SMITH & LE FEVRE

20/- *inc. postage*

WALTER KING, LTD.

11, Bolt Court, Fleet Street,

E.C.4.

WALTER KING SERVICES—4

MANUAL OF GAS FITTING

by

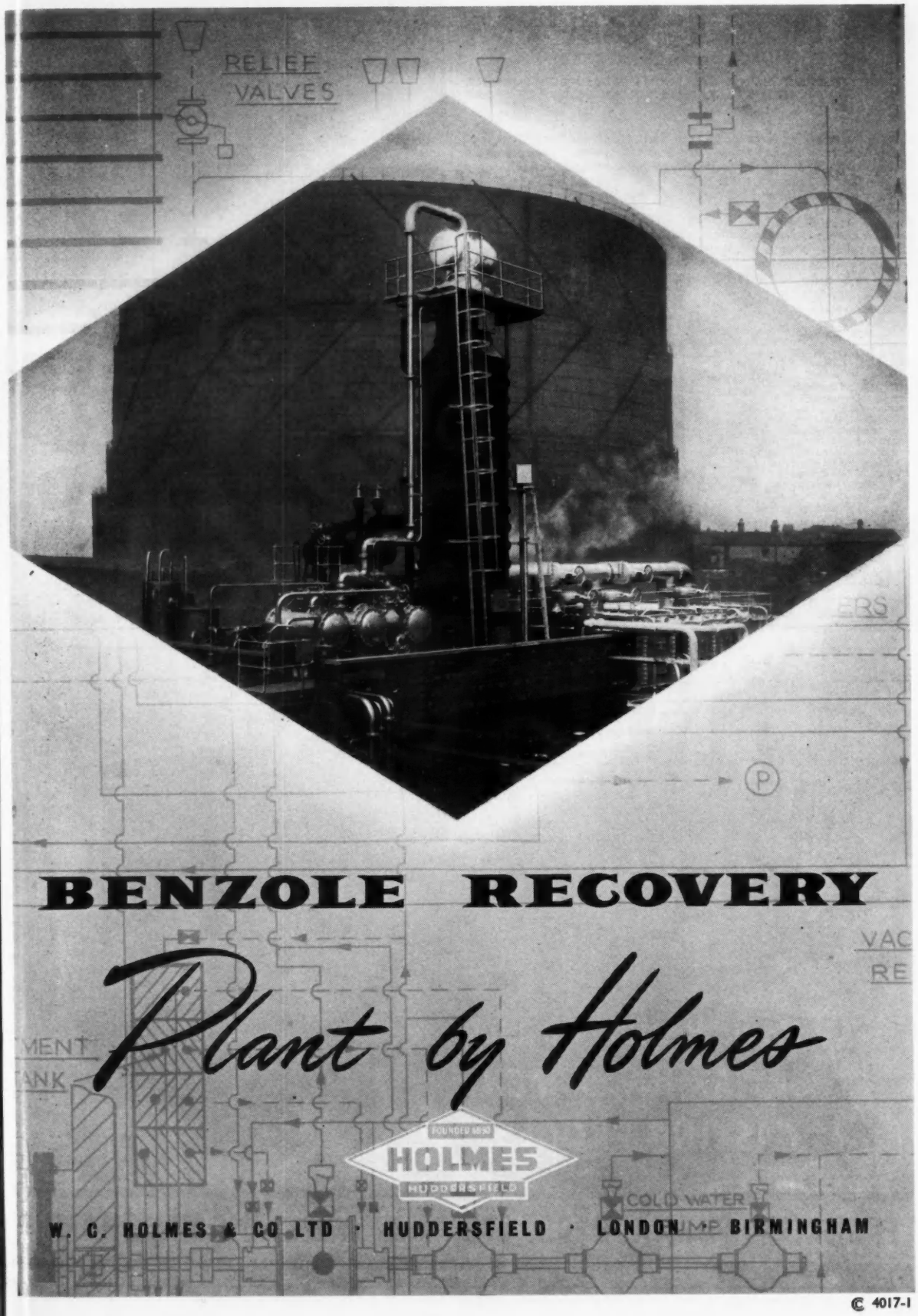
R. N. LeFevre

The Theory and Practice of Gas Installation Work and the Servicing of Gas Appliances and Equipment.

PRICE 30s. including postage

FROM

WALTER KING, LTD. 11, BOLT COURT, FLEET STREET, LONDON, E.C.4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industrial gas compressors

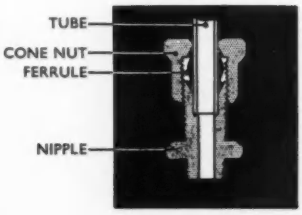
FOR COMPRESSING AIR OR GAS SUPPLIES USED FOR FURNACE HEATING, METAL MELTING, BRAZING, SOLDERING BITS, LAUNDRY IRONS, ETC.

DIRECT COUPLED COMPRESSORS (see illustration right) are fitted with automatic internal by-pass valves and lubrication systems. They are direct coupled to Keith Blackman motors. Type OA compressors in this range occupy a floor space of only 18" x 7½".
CAPACITY RANGE: 100 to 750 cub. ft. of gas or air per hour at 3 lbs. per sq. in. pressure.

TYPE 4 COMPRESSORS (not illustrated) are also fitted with automatic internal by-pass valves and lubricators. The complete unit includes motor and drive on a common bedplate, all of Keith Blackman manufacture.
CAPACITY RANGE: 500 to 20,000 cub. ft. of gas or air per hour at 3-5 lbs. per sq. in. pressure.
AREA OCCUPIED: from 9¼" x 16½" to 61" x 27".

DID YOU KNOW?

KEITH BLACKMAN have been making compression joints for many years and the present design embodies features developed as a result of this long experience. Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.



serving to burn

Note: the four burner heads (right) are for high pressure gas, or low pressure gas and air blast.

LEFT: "Fishtail" type burner with two-armed stamped pattern injector for heating liquid in tanks by submerged combustion tubes. For use with low pressure gas supplies.
Size Range: 1", 1¼", 1½", 2" and 2½" outlets.
Capacity Range: 45-280 cub. ft. of gas per hour.

Brass non-blow-off head types: deal with 5 to 10 cub. ft. of gas per hour.

Stainless steel, "F" type head, burner: deals with 8 cub. ft. of gas per hour.

Perforated head type burner: deals with 10 to 15 cub. ft. of gas per hour.

Keith Blackman LIMITED
MILL MEAD ROAD, TOTTENHAM, LONDON, N.17
'Phone: T. Tottenham 4511 (twelve lines) 'Grams: "Keithblac, Nortotte, London"
BRANCH OFFICES: AT MANCHESTER, BIRMINGHAM, LEEDS, GLASGOW, NEWCASTLE-ON-TYNE, PENARTH near CARDIFF AND BELFAST

INDUSTRIAL GAS EQUIPMENT

524

Mould Heating Furnaces for WAX INVESTMENT CASTING PROCESS

FRANKLIN FURNACE CO. LTD. BAKER STREET **BIRMINGHAM 11.**

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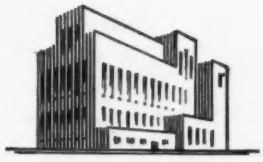
SYSTEMS

one aim . . .

GLOVER – WEST

CONTINUOUS VERTICAL RETORTS . . . . . .



C.O.L

INTERMITTENT VERTICAL CHAMBERS . . . .

. . . efficient carbonization

WEST'S

GAS IMPROVEMENT CO. LTD

ALBION IRONWORKS · MILES PLATTING · MANCHESTER 10

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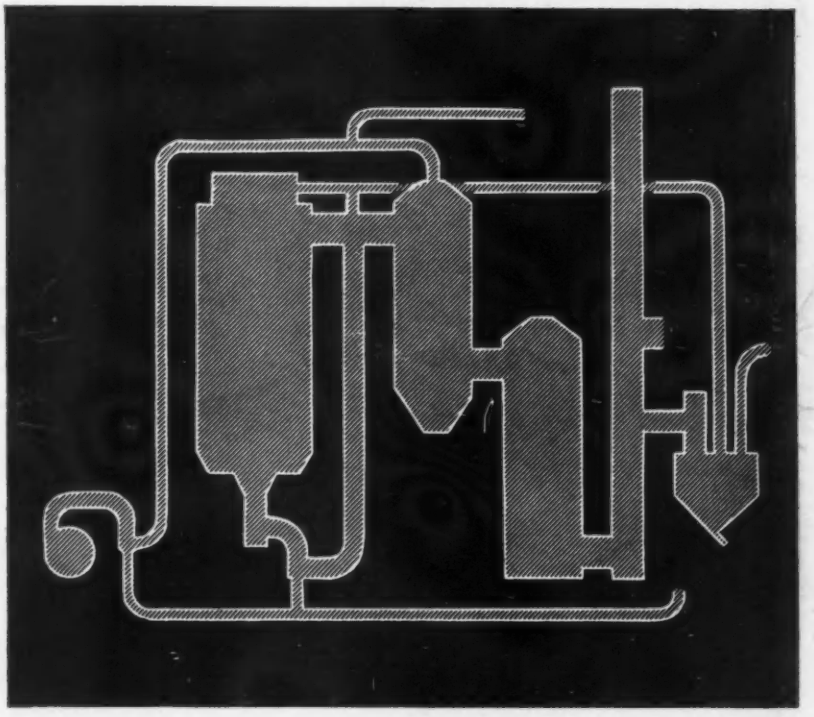
GCI

Complete Gasification Plant for the Towns Gas Industry

EXHAUST STEAM FOR PROCESS

COAL AND HEAVY OIL



PGC

THE POWER-GAS CORPORATION LTD

(PARENT COMPANY OF THE POWER-GAS GROUP)

STOCKTON-ON-TEES & LONDON

AUSTRALIA CANADA FRANCE INDIA SOUTH AFRICA

15